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NEW YORK, SATURDAY, MAY 18, 1912

CONTENTS

The Keystone Railway Club..... 817
Elevated Values in Chicago..... 817
The City Limit of Uniform Fare..... 818
A Group of Transmission Papers..... 818
The Result of 7-Cent Tube Fares..... 819
Re-equipment of the Fort Dodge, Des Moines & Southern for 1200-Volt Operation..... 820
Recent Decision in the Peoria Water Works Case..... 827
A Review of Heavy Electric Traction in Europe..... 827
Valuations of Chicago Elevated Railways..... 829
Executive Committee on the Pacific Coast..... 833
Contracts for Equipment Between Stamford and New Haven..... 836
Moving Pictures on a Chartered Car..... 836
Gas-Electric Motor Cars for the Frisco System..... 837
Freight Train Test on Fort Dodge, Des Moines & Southern Railway 838
Interstate Commerce Commission Accident Report..... 839
Bids Invited for Electrification of Melbourne Suburban Railways.. 839
The Ljungström Steam Turbine..... 839
Organization Meeting of the Keystone Railway Club..... 840
New Equipment for Boston..... 841
Contracts for Power..... 841
Building for the Future..... 842
Substations of the Piedmont Traction Company..... 843
New Method of Measuring Steam Consumption..... 843
New Emergency Car Jack..... 844
Louisville Railway Slotting Machine..... 844
A New Sheet-Steel Gear Case..... 845
A Chain Type Mortiser..... 845
News of Electric Railways..... 846
Financial and Corporate..... 849
Traffic and Transportation..... 852
Personal Mention..... 855
Construction News..... 856
Manufactures and Supplies..... 859

THE KEYSTONE RAILWAY CLUB

The Keystone Railway Club, whose organization and purposes are described elsewhere in this issue, promises to prove a welcome addition to the group of territorial electric railway societies which supplements so ably the broader work of the national association. This new body offers an effective medium for the interlinking of the many small or medium-sized railways in eastern Pennsylvania and adjacent territory which hitherto have not enjoyed the benefits derivable from the discussion of problems of mutual interest. Without considering executive matters, such as are handled by the Pennsylvania Street Railway Association, the club will find ample scope for its activities in the study of practical every-day questions relating to the betterment of the mechanical, electrical and transportation departments of the properties which its members represent. The territory which the Keystone Railway Club proposes to embrace has been wisely restricted without regard to state lines, so that any meeting place which is chosen can be reached by most members without more than three or four hours' travel. This decision should contribute greatly to the permanent success of this organization as it will enable even the smallest companies to send representatives to most of the meetings at little expense of time and money.

ELEVATED VALUES IN CHICAGO

The principal points of difference in the valuations made on behalf of the companies and the city authorities in the Chicago Elevated Railways case lie in the estimates of real estate and rights-of-way values and the allowance for overhead charges. The real estate and rights-of-way value of an expert employed by the companies, incorporated by Professor Swain with the addition of 5 per cent for brokerage and promotion expenses in his complete valuation for the companies, was $46,779,073. The valuation made by the city expert for the city committee shows a total, taking the real estate and rights-of-way both inside and outside the city limits, of $16,490,728, to which 18 per cent is to be added for overhead charges. The allowance for overhead charges involves, of course, a much smaller problem and the difference is reduced by the fact that the full percentage allowed by the city committee for this purpose was applied to real estate. The city committee allowed for overhead charges 18 per cent on all physical property or $9,481,185 on the cost to reproduce new or $8,153,570 on the present value. Both of these figures include the property located inside and outside the city limits. Professor Swain's allowance of 30 per cent to cover all overhead charges, applied to the cost of reproduction new of the physical property exclusive of land and rights-of-way, equaled $11,865,674. He did not use a depreciated value for overhead charges, as did the city committee. While the allowance of 30 per cent made by Professor Swain did not apply to the real estate, he added to the value furnished by the real estate expert the sum of 5 per cent, as stated, to cover promotion and brokerage expenses. It is evident that after the deduction of differences on these two points the remaining discrepancies in the values reached by the city and the company representatives are based on inven-

tory values and become relatively small, amounting to something over $3,000,000 in the cost of reproduction new. The chief and serious question for negotiation if the conflicting appraisals are to be reconciled is the value to be allotted to the real estate and rights-of-way.

THE CITY LIMIT OF UNIFORM FARE

In his announcement of disappointment at the decision of a lower court ordering the extension of the 5-cent fare to the annexed city limits of Los Angeles, Vice-president Shoup of the Pacific Electric Railway voices a complaint against the 5-cent uniform fare theory. While the claims in this case are to be carried for adjudication to the higher courts, the interview of Mr. Shoup is expressive of a discontent among railway managers that is increasing and is bound to find expression in various communities in the future. The facts are that the uniform rate of fare and the irrepressible tendency of municipalities in the mad rush for territorial greatness to extend their boundaries by the absorption of uncounted square miles of territory are combining to increase the length of haul so seriously as to lead to intolerable results. It is generally true, as Mr. Shoup says, that the 5-cent fare had its origin in convenience, but there were also other factors that managers of electric railways did not overlook if they were alert to protect their interests. The cities were not so large as they are at the present time, the costs of construction and operation were less, real regulation was unborn and the prospects of profit looked good, as they naturally had to look in order that the necessary capital might be secured. It is, we believe, only a question of time when the 5-cent fare will give way in some communities, experimentally at first, to a more logical system in which the rates will be apportioned more closely to the distance each passenger is hauled.

A GROUP OF TRANSMISSION PAPERS

Several papers at the Schenectady meeting of the American Institute of Electrical Engineers are of particular value to those engaged in power transmission for railway purposes. One of very general importance is the thorough review of transmission line design by Mr. Worcester. This gives in a very compact and readable form an outline of mechanical considerations to be met and a sort of compendium of sound practice in line design. Altogether it is one of the most helpful papers to the engineer that we have had the pleasure of seeing in a considerable time. Ordinary practice in line building is fairly familiar to the constructor, but its refinements, on which economy and security of line depend, are less understood. A transmission line is no stronger than its weakest part, and a common tendency in the past has been to forget this fact on the tacit assumption that if the chief elements of construction are extra strong the line will do good service. On the contrary, it is obvious that an increase in the factor of safety in one part of the line does not help the factor of safety elsewhere. One thing which Mr. Worcester brings out very clearly and which is not uncommonly forgotten is that for every line there is a certain length of span which gives minimum cost and this length may vary considerably under different circumstances. A curious fact regarding it is that in the case of small transmissions in which the wires themselves are small the maximum span permissible is comparatively short.

In the design of a line a conductor is always assumed to carry load due to wind and possible ice, in addition to its own weight. Since these added loads are particularly severe in the case of small wires, relative to their tensile strength, it follows that it actually may be economical in the smaller transmissions to use an unnecessarily big wire in order to gain reserve of strength against extraneous loads and to utilize some of this gain to increase the span. In one case figured out by Mr. Worcester the gain in total cost by increasing the condenser size from No. 4 to No. 2 rose to nearly 10 per cent. The occasional extraordinary strains of ice and winds are somewhat less feared now than in the earlier days of transmission-line construction. The allowances laid down by Mr. Worcester for these seem to be ample, without the exaggeration which has been rather prevalent in the past. The worst condition, of course, is that of ice coating combined with high wind and low temperature. As a matter of practice, since ice coating does not form at low temperatures and in many parts of the country high winds and low temperatures do not commonly come together, the chance of all three factors being anywhere near the maximum is pretty nearly negligible. Mr. Worcester, indeed, seems to attach more importance to the effect of the wind on the towers than to that on the line in general. We are inclined to think, however, that an allowance for the maximum recorded wind pressure, amounting by Mr. Worcester's figure to a little over 23 lb. per square foot, is somewhat excessive. In the first place the velocity of the wind falls off rapidly near the surface, so that the government records taken at a considerable height are excessive, and in addition it is not at all probable that this maximum pressure is likely to come directly across the line or in the particular direction which will catch the tower in its line of least resistance. So high an allowance for wind pressure is unnecessary except in very exposed places where the towers are exposed to the prevailing high winds in disadvantageous directions. For any given locality extreme high winds usually come from pretty nearly determinate directions and in many cases a suitable guying system will considerably cut down the cost of towers.

Some practical points regarding tower and insulator design suggested by Mr. Worcester are extremely pertinent. For example, he points out that with the suspension insulators conditions may arise in which the effect of a break in the line may be even greater than it would be with a pin-type insulator. He also shows that in the case of the flexible towers or A poles, rigid across the line and flexible along the line, the strain produced by a break is transferred to the wires which remain intact, and this fact should be allowed for in planning the factor of safety of the wire itself. When this allowance is duly made the flexible construction presents large advantages by reason of the small weight and cost of the towers, advantages particularly important in the case of high-voltage systems where a duplicate line is desired.

Another paper of great interest to the railway engineer is that by Creighton, Shavor and Clark on protective apparatus for railways. The ordinary method of protection

against lightning and similar abnormal disturbances is to provide each car with one or more arresters, in connection with a choking coil, and to provide the line itself with arresters to diminish the chance of getting any considerable discharge at the car. As the authors point out, the nature of the car wiring is often such as greatly to increase the chances of damage. The trolley connection, the ground wire and the trolley wires are commonly massed in the same cable. Under these circumstances the inductive effect of an entering lightning discharge may do great damage in spite of the lightning arrester. If one stops to think of the matter, perhaps the majority of so-called lightning discharges which affect electrical machinery are inductive and not due to a bolt falling directly on the line. Experiments carried on by the authors showed that the induced voltages obtainable under quite supposable conditions are enough to imperil the insulation. The general rule laid down is that wires liable to carry lightning current near and parallel to the ordinary car wiring going directly to the apparatus should be so far as possible avoided. Even the electrostatic effects due to a mass of insulated wires are to be feared.

An important practical application of this and other allied precautions is shown in the work done on the Denver City Tramway, in which a combination of judicious rewiring of the cars and the installation of aluminum lightning arresters on the cars, together with additional protection on the trolley line, practically removed what had been a very serious source of damage. The consequence was that while in 1909, before the changes began, more than one hundred armatures were damaged during the course of the season there was only a single case of this kind in 1911, a more than usually severe year. Suspension of service, which had formerly been frequent, disappeared, and one instance is mentioned in which lightning shattered three poles supporting the trolley wire while a passing car escaped with merely a damaged arrester. Incidentally the paper is full of interesting matter regarding the construction and operation of lightning arresters, and as a corollary to this Messrs. Creighton and Shavor give an interesting account of some new developments in lightning arresters suitable for protecting the alternating-current distributing systems which so often form an important part over railway network. Good and simple arresters for this line of service have been painfully scarce, and it is encouraging to see that apparatus of this class is now being made the subject of painstaking investigation and rapid improvement.

THE RESULT OF 7-CENT TUBE FARES

It is a fact of significant bearing upon the fare question that the gross revenue per passenger carried by the Hudson & Manhattan Railroad in the fiscal year ended March 31, 1912, averaged 5.25 cents, a gain of 0.25 cent as compared with the preceding fiscal year. It is the increase in the rate of fare between New Jersey terminals and points in uptown New York that made possible this gain and the resultant improvement in earnings. As this increase, making the rate of fare 7 cents instead of 5 cents for this trip, or 40 per cent higher, was placed in effect on Dec. 24, 1911, it influenced the financial operations for a little over one-quarter of the year. For the purpose of making a rough calculation as to the approximate effect of the new rate of fare upon the operations for twelve months, we may disregard the eight days of December in which the higher rate was operative and also the new joint traffic arrangement in connection with the Newark rapid transit line, from which some business is received. With two rates of fare prevailing on the tube system proper, 5 cents for the trip between downtown New York and the New Jersey terminals and 7 cents between uptown New York and the New Jersey terminals, it is evident from the average rate of fare reported as the result of the increase in the last quarter that the traffic was divided about evenly in volume between the two classes of hauls; that is to say, in the last three months of the year about as many passengers were hauled at the 7-cent rate of fare as at the 5-cent rate. The average rate of fare in a full twelve months of operation, with traffic evenly divided between the 7-cent and 5-cent hauls, would be 6 cents. This, therefore, appears to be the approximate average passenger revenue per passenger received at the present time by the Hudson & Manhattan system.

When the increase in the rate of fare was announced it was explained as due to the need of greater earnings in order that the system might yield taxes and fixed charges. The higher rate has now been in effect nearly five months and observation does not show that any detrimental effect on the traffic has resulted. This is due to the highly specialized nature of the service offered by the company. Not only is the service one of unique character, but it is patronized largely by the commuter class and is therefore removed from the usual city influences that produce a large volume of passenger business with an increasing length of average haul on the ordinary urban railway. The Hudson & Manhattan haul is so short a one that its average passenger revenue per mile of road reaches the sum of $398,317. If the revenue is averaged over the track mileage instead of the miles of road, it is found that the average is $200,017. The natural development of traffic should produce an impressive increase from year to year in these figures.

Several other points in the Hudson & Manhattan report have a bearing upon the fare situation that is of no less interest than its gain in average passenger revenue. Including the other railroad operating revenues, the average return per passenger was 5.61 cents, a gain of 0.32 cent over the preceding year. Operating expenses, excluding taxes, amounted per passenger to 2.13 cents as compared with 2.14 cents in the previous year. The net railway operating revenue averaged 3.48 cents per passenger, or an increase of 0.33 cent over the fiscal year 1911. The total amount received from extra 2-cent fares in the period of three months and eight days during which the higher rate was in force was $158,558; in other words, 7,927,900 passengers paid the regular fare of 5 cents plus 2 cents for the haul involving the higher rate. A part of this gain was overcome in expenses and charges, but the net result of operations of the company for the fiscal year ended March 31, 1912, as shown in the abstract of the report published elsewhere in this issue, was a surplus after provision for expenses, taxes and charges of $50,279, as compared with a deficit of $41,890 in the previous year. The change in the rate of fare, radical though it appeared to be, has furnished the greater income that was needed.

Re-equipment of the Fort Dodge, Des Moines & Southern for 1200-Volt Operation

This Steam Road Was Equipped in 1906 for Handling Passengers by 600-Volt Trolley—On Account of the Growth of Traffic the Road Has Just Been Re-equipped for Handling Both Freight and Passenger Services by 1200-Volt Trolley

The Fort Dodge, Des Moines & Southern Railroad is now completing the reinsulation and re-equipment of its electrified steam lines for operation with direct current at 1200 volts. This property, which includes 170 miles of track, serves a combined agricultural and mining district in central Iowa and is particularly fortunate in deriving from freight a considerably greater proportion of its revenue traffic than has been obtained for most other electric roads. During the reconstruction period the track, roadway, rolling stock equipment and power house have been put in condition comparable with that of a new road. This property, formerly a steam-operated freight and passenger road, was enlarged and electrified in 1906. An illustrated description of the new work appeared in the Electric Railway Review for May 25, 1907, page 672. The territory served is shown on an accompanying map. The present southern terminal is over the local tracks of the Des Moines City Railway, but construction work has been started on a new private right-of-way entrance into Des Moines. This new work includes the construction of 6 miles of connecting track and the electrification of 4 miles of existing steam railroad track in addition to the installation of trolley wires over 2 miles of the main line tracks of the Chicago, Rock Island & Pacific Railroad. This will permit the passenger trains of the Fort Dodge, Des Moines & Southern Railroad to use the station of the Rock Island Railroad as its Des Moines terminal and will reduce by 15 minutes the running time into the city. From Des Moines the main line of the Fort Dodge, Des Moines & Southern line extends north and west to Fort Dodge, 86.3 miles. A line 26.9 miles long connects Rockwell City with the main line at Hope, which is 23.1 miles south of Fort Dodge. A section of the original steam line from Newton to Des Moines Junction, 36.7 miles, including a 4-mile branch from Goddard to Colfax, has not been included in the electrification program.

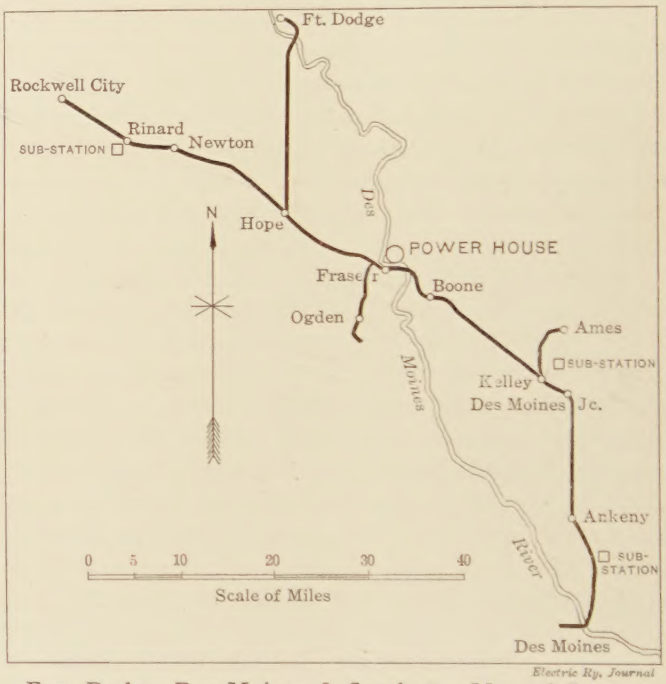
REASONS LEADING TO ELECTRIFICATION

It was about four years after the original road had been in operation that the branches from Fort Dodge Junction to Fort Dodge and from Des Moines Junction to Des Moines were built and electrified. The initial idea was to handle the passenger service between Des Moines and Fort Dodge electrically and operate the freight service by steam locomotives. Growth of the freight business continued at such a rate that the total receipts for freight soon exceeded the passenger receipts, and it was found desirable to haul the freight electrically. Accordingly electric locomotives were ordered and placed in service.

The business, both passenger and freight, still continued to increase until some means had to be adopted to increase the traffic-handling facilities. It is a significant fact that this could be, and has been, accomplished by a change from 600-volt to 1200-volt operation, and it is of great importance to note that these changes so far as the power house and substations are concerned have involved but a small capital outlay, as the only new apparatus necessary was one 1200-volt rotary converter and the necessary switching apparatus to control the higher potential. The rotary converters formerly used for 600 volts have been relocated and put two in series to give 1200 volts.

Before entering into details concerning the electrical equipment it is necessary to add some remarks about the present physical characteristics and changes of the road. A branch line known as the Ogden branch has recently been built to handle the coal traffic from mines located near Ogden. This branch leaves the main track at Niles, near Fraser, and extends to Ogden. From there cars run over 4 miles of track of the Minneapolis & St. Paul Railroad and 1 mile of new track to a coal-mining district. The total length of this branch is 9 miles, and it is operated with a 1200-volt trolley.

There is another branch road running from Kelley to Ames, which is at present operated at 600 volts, but may eventually be changed to 1200-volt operation. It is 7.5 miles in length and includes about 2 miles of the Ames & College Railway.



Fort Dodge, Des Moines & Southern—Map of System

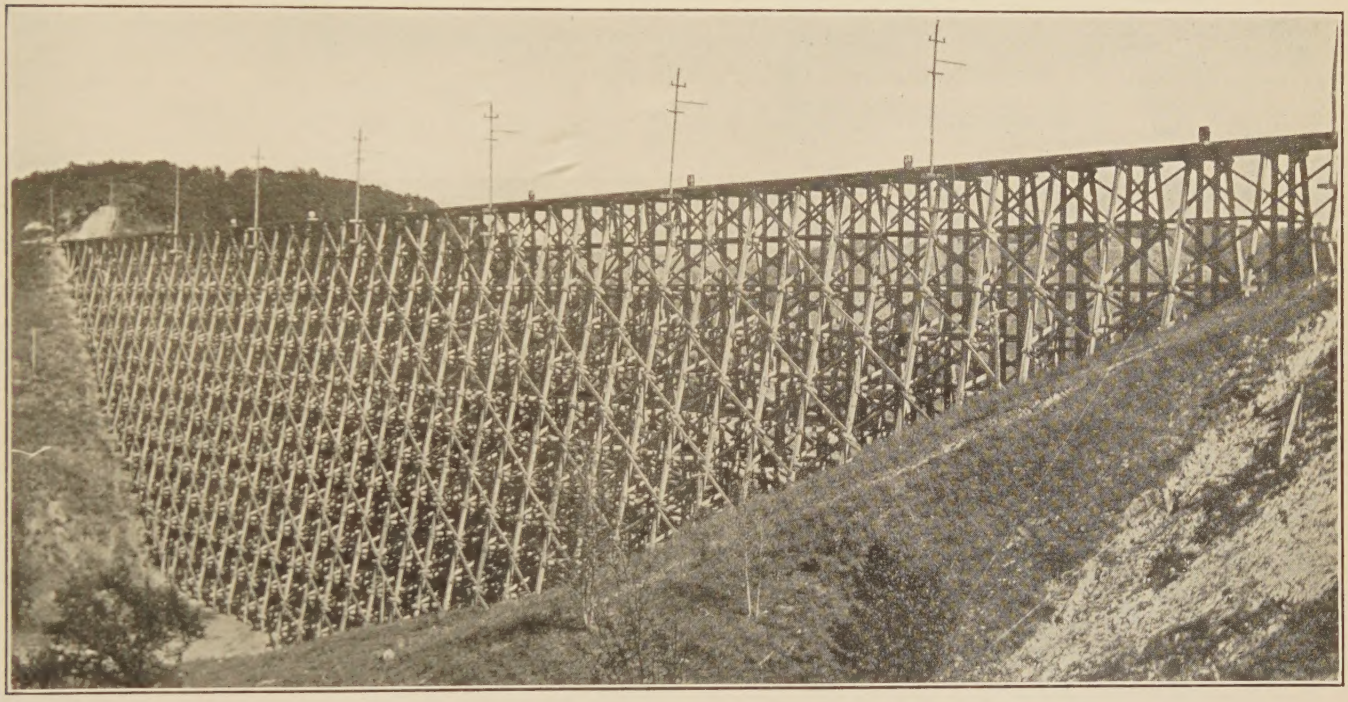
At present the northern terminus of the road is in Fort Dodge City. The interurban passenger service operates over about 1 mile of city track. The Fort Dodge local city lines, which are owned by the interurban company, have about 6 miles of track and at present are operated at 600 volts. The private right-of-way line used by the interurban road in running into Fort Dodge will be changed to 1200 volts this year in order to handle the increased business, and it is probable that the whole city system will eventually be operated at 1200 volts. Just outside Fort Dodge proper there are about 10 miles of switching and yard tracks connecting numerous gypsum mills in the vicinity with the Fort Dodge yards.

The Des Moines City tracks are owned by a separate company, but the Fort Dodge, Des Moines & Southern Railway has running rights from Polk Junction to Des Moines, a distance of about 5 miles. This will always be operated at 600 volts, but the new cut-off, earlier mentioned, which is being built from Ankeny right into the Rock Island depot at Des Moines, will be operated at 1200 volts. The distance from Ankeny to Des Moines is about 11.4 miles.

There is a city system of electric cars in Boone which is operated at 600 volts, but is not connected in any way with the Fort Dodge, Des Moines & Southern Railway.

As will be seen by reference to the map, the principal towns served are Fort Dodge, Rockwell City, Boone, Fraser, Ogden, Ames and Des Moines. There are besides these numerous smaller towns and villages which supply a good share of the business. Passenger trains are run each way about every two hours on the main line and on the Ames and Rockwell City branches.

The freight business has increased enormously of late, and the receipts from this source now exceed 65 per cent of the totals. The stucco mills at East Fort Dodge supply more than 1200 tons of freight per day, and the numerous coal mines located along the line supply nearly 2000 tons per day. In addition to this a very considerable business is done in hauling grain, as the whole district traversed is very rich agriculturally, and the transportation of live stock also adds considerably to the receipts. The railway company has developed a considerable business in pumping sand from the Des Moines River, drying it and hauling it to various points to be sold for building purposes. It is estimated that within a reasonable time the average gross tonnage of freight business will amount to 4000 tons per day.



Fort Dodge, Des Moines & Southern—Long Trestle Near Boone

TRACK RECONSTRUCTION

The track and roadway of the Fort Dodge, Des Moines & Southern Railroad was built originally for steam operation and thus permits of high-speed operation and the handling of long freight trains, 800 tons, with electric locomotives. During the past year 42 miles of line have been resurfaced by the addition of about 500 cu. yd. of new ballast per mile. The topography near Boone, Fraser and Fort Dodge—that is, in the valley of the Des Moines River—is rough, and several large bridges and trestles, one of which is illustrated, were required in the original construction of the road. The trestle shown in the accompanying illustration is 800 ft. long and 156 ft. high. It is one of a series of five similar trestles built on a grade leading from Boone down into the river valley near the power house at Fraser. Surveys and estimates have been made for a new line by which the road will cross the river on a high-level steel bridge.

The track is laid with 70-lb. rails. Whenever bond renewals are necessary the American Steel & Wire twin-terminal bond is installed. A large number of small timber trestles and bridges are being replaced with concrete box culverts or short steel spans.

A new classification yard, with seven main tracks in addition to the through tracks, has just been completed at Fort Dodge. It is necessary to keep one and sometimes two freight locomotives switching in service at Fort Dodge all the time. The traffic originates from the gypsum mines and manufacturing plants located near East Fort Dodge. Industrial tracks extend to practically all of these plants, and the electric road has the only line into several of the larger factories. It does a general switching service here in addition to making up one or two 800-ton trains of gypsum products which are handled south over the full length of the line each night.

POWER HOUSE

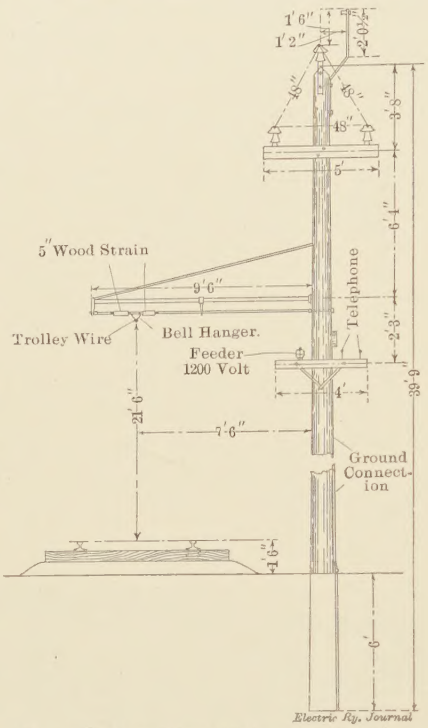
The power house is at Frazer, which is approximately midway between the terminal substations. It is near the Des Moines River, from which water is drawn for condensing and feed purposes.

The principal machinery of interest in the power house is two Westinghouse 1250-kw horizontal steam turbines which run at 1500 r.p.m. on a working steam pressure of 180 lb. They are operated condensing with a normal vacuum of 28 in. The generators are of the ATB type and are wound for 2300 volts and a frequency of 25 cycles per second. The electrical connections of the power house are shown on page 824. The purchase of an additional turbo-generator of 2500-kw capacity has been considered. In this event a new transformer house will be erected near the station.

There are five boilers of the water-tube type, four rated at 400 hp each and one at 500 hp. These are fed by Green traveling link grates, which are operated by a 15-hp induction motor. Formerly the boilers were hand-fired, but during the rehabilitation of the road steel hoppers for storing coal have been installed in connection with the other automobile coal-handling machinery. The hoppers are filled by a grab bucket operated by a Browning Engineering Company locomotive crane driven by a 75-hp railway motor. This locomotive crane is used also for loading sand for shipment and sale and is described in detail later in this article.

HIGH-TENSION TRANSMISSION

No changes have been made in the high-tension transmission layout other than to connect up the new substations. The operating voltage is 22,000, but in the future if conditions warrant it the connections may be changed from delta to Y and the potential raised to 38,100. The frequency is 25 cycles per second. The transmission line proper consists of three No. 4 B. & S. copper wires. Lightning arresters are placed on every tenth pole, and as an additional precaution a ground wire is strung for the entire distance. This is supported on an iron angle bent to the shape shown in the illustration and bolted to the pole head.



Fort Dodge, Des Moines & Southern—Track and Overhead Construction

OVERHEAD TROLLEY CONSTRUCTION

The pole line on the Rockwell City line and the main line from East Fort Dodge to Roberts consists of 40-ft. 8-in. top cedar poles, the main line from Roberts to Ankeny of 40-ft. 6-in. top cypress poles and the road from Ankeny to Des Moines of 45-ft. 8-in. top cedar poles. The poles are spaced approximately 100 ft. apart and, besides the trolley, support the transmission line, feeder wires and telephone lines.

During 1911 250 wooden trolley poles were renewed or reinforced. The original trolley line was built with cypress, which had become considerably weakened, although the poles had been in the ground hardly five years. The poles were reinforced by being braced by a 12-in. stub which was sunk 6 ft. into the ground. The stub, before installation, was given a brush coating of C-A-Wood-Preserver. The pole is held to the stub pole by two through bolts and by bands of wire cable.

In the changes to 1200-volt operation the bell hangers on the main line where steam locomotives are sometimes used were supplemented by 9-in. wood strain insulators placed on either side of the hangers.

On the division from Hope to Rockwell City, where no steam service is run, standard 600-volt insulated hangers are used for the 1200-volt trolley. The results have been satisfactory.

The overhead construction on the divisions north of Boone extending to Fort Dodge and Rockwell City is largely constructed with the Ohio Brass Company's fittings, and the line south of Boone, including the catenary work on the new Des Moines terminal cut-off, is built with Westinghouse overhead fittings.

The trolley wire throughout is No. 000 copper of grooved section. The bracket form of construction is standard for the entire road.

FEEDERS

The changes necessary in the feeder system were slight and consisted practically of providing feeders for a new substation at East Fort Dodge and making the necessary redistribution from Ankeny to Des Moines over the new Rock Island cut-off. The location and capacity of the feeders as they are at present are shown in the diagram on page 834.

During the reconstruction period illuminated signs were hung on the trolley brackets at the line breakers dividing the 600-volt and 1200-volt sections. Each sign consisted of a black sheet-iron box with a celluloid transparency reading "1200 volts" on one side and "600 volts" on the other.

A description of the new automatic track-circuit-controlled block signals which are being installed on this road by the General Railway Signal Company was presented in this paper for Nov. 18, 1911, page 1056.

The entire line is protected by a system of hand-operated lamp blocks with red and green indications. The blocks are operated by the car crews, and no permissive following movements are permitted. Each block covers a territory from siding to siding.

LINE CAR

The line department has equipped its own repair car, which formerly was operated by a gasoline engine, with a 35-hp street railway motor and a chain drive. The gasoline engine was replaced by the motor as an emergency measure, and the electric service has been so satisfactory that it is planned to purchase a 20-hp, 1200-volt motor with proper gearing for use on this line car, which has a telescopic tower.

The overhead maintenance organization is subdivided into two gangs, one having jurisdiction from Des Moines to Boone and the other from Boone to Fort Dodge and Rockwell City. Two linemen also are stationed at Boone and these men have charge of the regular trolley, transmission, signal and telephone maintenance work. Each of these three trouble gangs is provided with a gasoline line car. The electric line car is stationed at Boone. Each trouble gang also has a light Sheffield velocipede with rubber tires. These velocipedes are compactly built and can be put into the baggage compartments of passenger cars. One of the operating rules of the road is that any regular train may be stopped by an emergency lineman while he stands on the car roof to replace a defective hanger or trolley support.

Fort Dodge, Des Moines & Southern—View Typical of Interurban Lines

PORTABLE ELECTRIC CRANE

The company also has the electric-crane car shown in the engraving on page 825. This crane was built by the Browning Engineering Company, Cleveland, Ohio, and is its standard No. 1 electric four-wheel, single-truck crane, equipped with a 46-ft. boom. It will lift from 3 tons to 15 tons at various radii ranging from 10 ft. to 40 ft. It is also arranged to use a 1½-yd. clamshell bucket, which is not shown. It is equipped with a 75-hp Westinghouse 112-B interpole motor with R controller and an electric headlight on the top of the hoist, so that the crane may be operated at night. A detachable cab protects the operator and mechanism in winter. All gears and pinions are inclosed. The crane has been found very useful in switching cars and for unloading bulky freight.

600-VOLT SUBSTATION LAYOUT

The six 600-volt substations were located at Roberts, Hope, Fraser (in the power house), Boone, Kelley and Ankeny. The electrical equipment in each of these substations was identical, the chief items being one 400-kw rotary converter and three 150-kw transformers wound for a primary voltage of 22,000 and a secondary voltage of 400, together with the necessary switching appliances.

The rotary converters were started by induction motors mounted on the end of the shaft. Besides these substations there was a portable equipment which could be used at any desired point as special conditions of traffic might demand.

1200-VOLT SUBSTATION LAYOUT

The change from 600 volts to 1200 volts on the trolley has involved no changes in the generating apparatus.

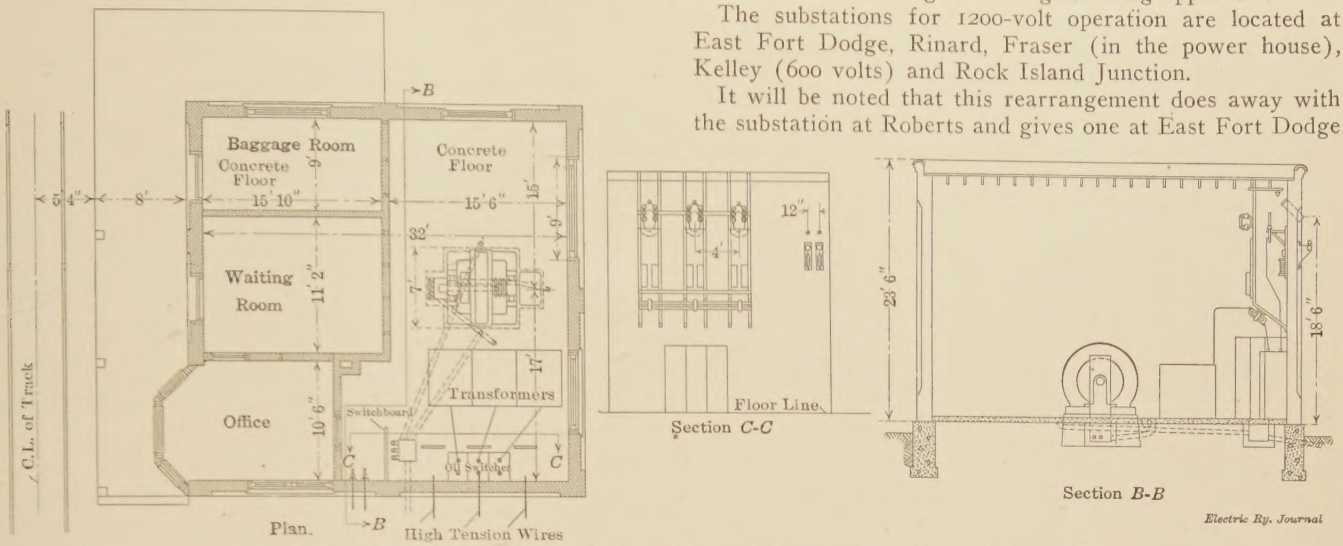
The substations for 1200-volt operation are located at East Fort Dodge, Rinard, Fraser (in the power house), Kelley (600 volts) and Rock Island Junction.

It will be noted that this rearrangement does away with the substation at Roberts and gives one at East Fort Dodge instead. This is a better arrangement electrically, as the freight movements at East Fort Dodge are very heavy on account of the numerous stucco mills in the immediate neighborhood which supply a very large proportion of the total freight handled, and besides this it is near the Fort Dodge yards, where a large number of freight trains are made up, involving a great many train movements.

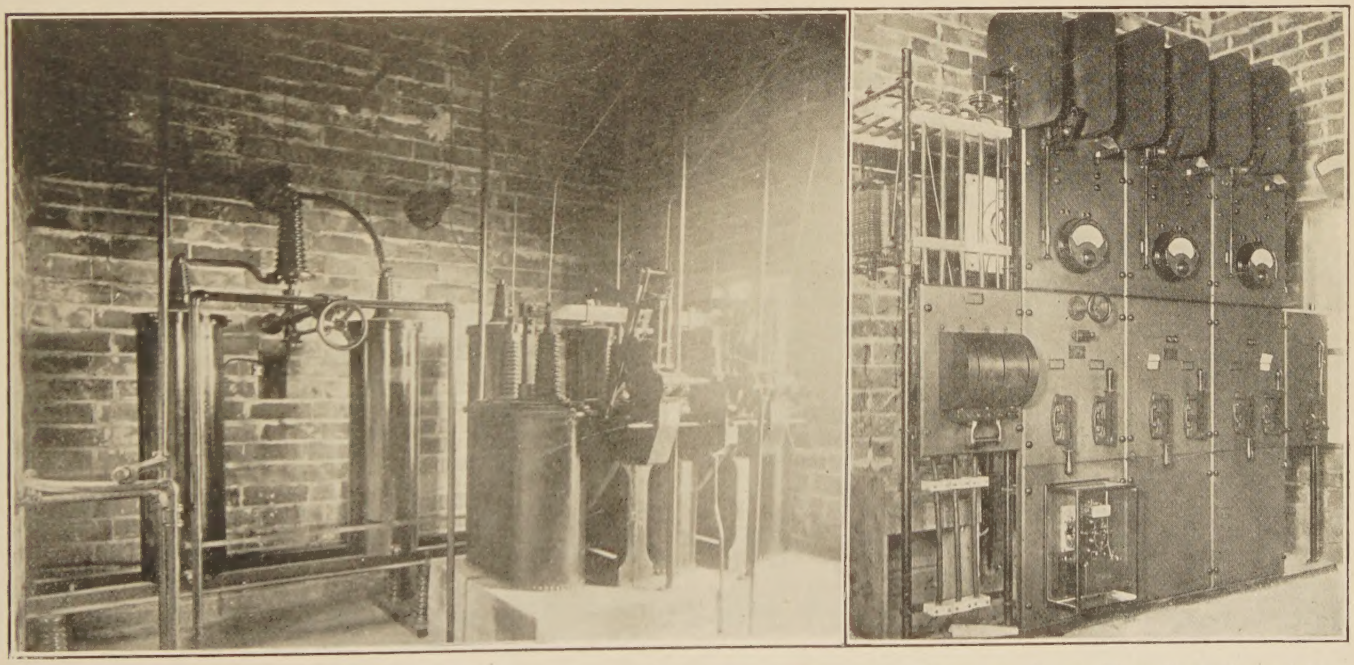
The substation at Rinard is new because this division was electrified at the time the other portions were converted for 1200-volt operation. The substations at Hope and Boone have been dismantled.

The Kelley substation will be retained, but only as a 600-volt substation to operate the Ames branch, and it is probable that this station may be eliminated if the Ames branch is ultimately operated with 1200 volts.

The substation at Ankeny is eliminated, and a new one



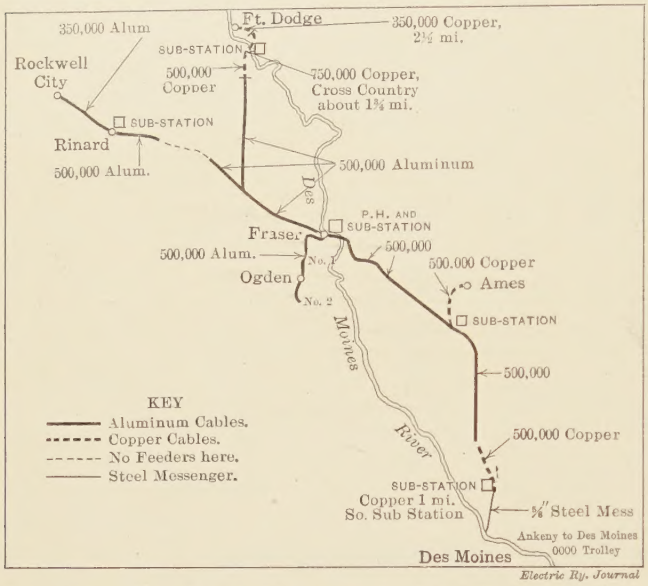
Fort Dodge, Des Moines & Southern—Plan and Sections of Substation at Kelley



Fort Dodge, Des Moines & Southern—Electrolytic Lightning Arrester, Oil Switches and 1200-Volt Switchboard in Rinard Substation

has been erected at Rock Island Junction to take care of the new cut-off running from Ankeny into Des Moines.

From the above it will be noted that whereas six 600-volt substations were needed only four 1200-volt stations will be required, and as has already been stated, the Kelley substation will be retained only to supply 600 volts for the Ames branch.



Fort Dodge, Des Moines & Southern—Map Showing Feeder System

Most of the substations are of a very similar design and include a baggage room, waiting room and office under the same roof as the substation. Their general arrangement is shown on page 823, where a plan is published of the Kelley substation and depot. An exterior view is also published of the substation at Boone, which also contains the general offices of the company.

In three of the 1200-volt substations the old rotary converters are used, two machines now being placed in series to give the higher voltage. The principal work involved has been the relocating of these units. In each case the high machine is insulated by being placed on a sub-base made of 7-in. oak frames, and as an additional precaution rubber mats are placed on the substation floor around the base. A wooden frame is placed around the bearing at the commutator end to permit the safe inspection of the brushes, and a box frame made of slats is placed over the starting induction motor of the high machine. In each of the above substations there are six 150-kw transformers. These are the same units as were formerly used for 600-volt operation.

The Rinard substation, the only one with new rotary converter equipment, has one General Electric commutating-pole, three-phase, four-pole, 300-kw unit, running at 750 r.p.m. and giving 1200 volts at the d.c. end. It is compound-wound and is provided with a brush-raising device to enable the brush to be raised from the commutator when the machine is started from the a.c. side. This machine is illustrated. For details concerning the function and construction of this brush-lifting device see an article in the Electric Railway Journal, June 24, 1911.

The transformer equipment at Rinard consists of three type H, 25-cycle, 100-kw, 22,000 to 38,100, Y, 740-volt, oil-cooled transformers, each provided with four 2½ per cent reduction taps in the primary and 50 per cent starting taps in the secondary to permit starting on the a.c. side. These transformers have approximately 15 per cent inherent reactance. The oil switches are of the K-10 type and the lightning arresters are of the electrolytic type.

The principal items comprising the 1200-volt switchboard at Rinard are:

One 300-kw, 22,000-volt, a.c. rotary panel.
One 300-kw, 1200-volt, d.c. rotary panel.
Two 1200-volt, 500-amp feeder panels.
One swinging bracket with voltmeter.
One a.c. rotary starting panel.
The lightning arresters are the aluminum cell type.

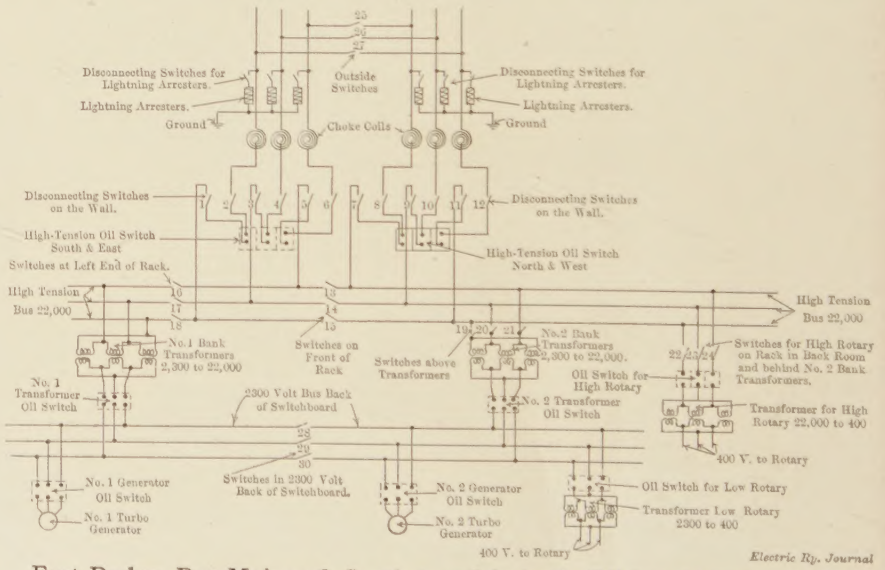
The Rinard switchboard is illustrated, and it should be noted that, following the General Electric Company's standard practice, the handle controlling the circuit breaker on each panel is mounted pointing downward and the main switch handle in the reverse position. This arrangement has been adopted to avoid any confusion which might be occasioned owing to these handles being similar in appearance. Those substations which have been converted from 600-volt to 1200-volt operation have new switching apparatus to handle the higher potential. These switchboards are of the same design and consist of:

One 1200-volt, 800-amp d.c. rotary panel.
Two 1200-volt, 1200-amp d.c. feeder panels.
One swinging bracket with voltmeter.

ROLLING STOCK

The rolling stock equipment now includes ten combination passenger cars and seven 40-ton electric locomotives and 500 freight cars. Two 60-ton locomotives are now under contract.

The passenger cars formerly were equipped with type M control for 600-volt trolley operation. During the period of reconstruction these cars have been strengthened and re-equipped with 1200-volt apparatus, including four GE-205 motors. The car body has been strengthened by the addition of 8-in. 21-lb. channels, extending from corner post to corner post, applied to the outside of the outer sills. The side framing has been reblocked, and the under frame has been stiffened by the insertion of diagonal bracing. Edwards trap doors have been added to the platforms, and the interior finish has been taken out and refinished. About $1,500 has been spent on the strengthening and refinishing of each passenger-car body. The ten standard passenger cars have quadruple equipments of GE-205 motors, which are 75-hp units, and type M control apparatus. The motors are of the box-frame commutating-pole type, especially designed for heavy interurban service.


Disconnecting Switches for Lightning Arresters.
Lightning Arresters.
Ground
Outside Switches
Choke Coils
Disconnecting Switches for Lightning Arresters.
Lightning Arresters.
Ground
Disconnecting Switches on the Wall.
High-Tension Oil Switch South & East
Switches at Left End of Rack.
Disconnecting Switches on the Wall.
High-Tension Oil Switch North & West
High Tension Bus 22,000
High Tension Bus 22,000
No. 1 Bank Transformers 2,300 to 22,000
Switches on Front of Rack
Switches above Transformers
No. 2 Bank Transformers 2,300 to 22,000.
Switches for High Rotary on Rack in Back Room and behind No. 2 Bank Transformers.
No. 1 Transformer Oil Switch
2300 Volt Bus Back of Switchboard
Oil Switch for High Rotary
No. 2 Transformer Oil Switch
Transformer for High Rotary 22,000 to 400
400 V. to Rotary
No. 1 Generator Oil Switch
No. 1 Turbo Generator
Switches in 2300 Volt Back of Switchboard.
No. 2 Generator Oil Switch
No. 2 Turbo Generator
Oil Switch for Low Rotary
Transformer Low Rotary 2300 to 400
400 V. to Rotary
Electric Ry. Journal

Fort Dodge, Des Moines & Southern—Schematic Wiring Diagram of Main Power Circuits in Fraser Power Station

CONTROL

The type M control is of the non-automatic type and is arranged to provide full speed on both 600 volts and 1200 volts. The current is collected by a standard trolley wheel. The arrangement of the circuit breaker, contactors and reverser is the same as in standard 600-volt, type M equipments with the exception that additional insulation is used and that there are extra breaks on the line side of the motors.

Fort Dodge, Des Moines & Southern—Substation at Rinard

The commutating switch consists of two cylinders, of which one is to commutate the motor circuits and at the same time to transfer the control, lighting and compressor circuits from the low-voltage tap of the dynamotor to the trolley and vice versa. The second cylinder provides for any motor being cut out should it become disabled. The commutating switch is operated either by hand or air. When operated by air it is interlocked with the master controller so that the motor circuits must be open before the commutating switch cylinder can be thrown.

CAR BODIES

All of the cars were built by the Niles Car Manufacturing Company. The principal data concerning these cars are as follows:

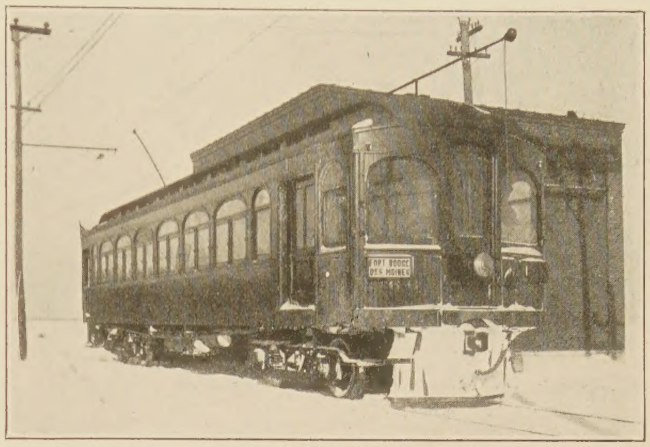
Fort Dodge, Des Moines & Southern—Combination Station and Substation at Boone

Length over all	53 ft. 3¾ in.
Length over body	48 ft. 5 in.
Width over all	9 ft. 10 in.
Height over all	14 ft. 4 in.
Weight of trucks (each), with motors	Approximately 16,000 lb.
Weight of car complete	75,000 lb.
Type of truck	Baldwin, solid frame
Distance between truck centers	32 ft. 6 in.
Wheelbase of trucks	7 ft. 0 in.
Diameter of wheels	36 in.
Seating capacity	50 passengers

Locomotive type pilots sheathed with steel are used, as shown below.

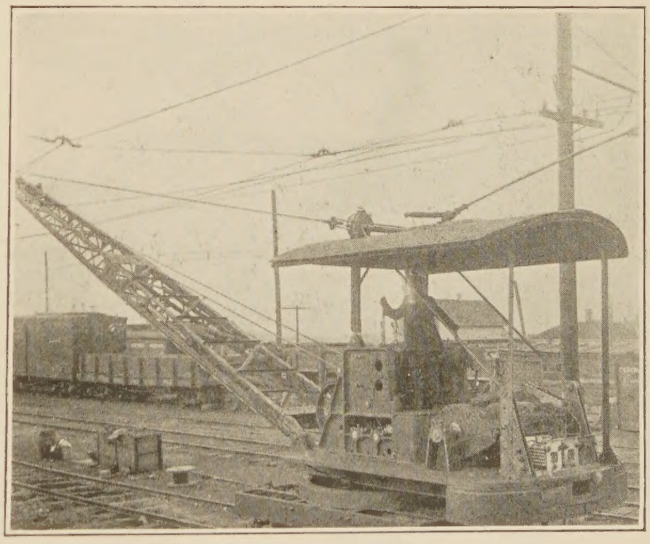
SIDE-ENTRANCE CAR

An old baggage car has just been rebuilt into a center-entrance, three-compartment passenger and express car. This car has two side center entrances, two motormen's cabs, a smoking compartment seating sixteen passengers, a general compartment seating eighteen passengers, a baggage section and a toilet room. Its length over all is 42 ft. This car body is mounted on the same type of Baldwin trucks as that standard for the larger passenger cars. Its motor equipment, however, includes only two GE-206-A, 100-hp motors, one placed on each end axle. The motors are geared to 52 m.p.h.



Fort Dodge, Des Moines & Southern—Standard Car

This car is designed for shuttle service on the 27-mile extension from Hope to Rockwell City and is scheduled to make this run in fifty minutes, connecting with the through Des Moines-Fort Dodge cars every other hour. The center-entrance car weighs 58,000 lb. complete as compared with 75,000 lb. for the standard passenger cars, and under test it has been found to consume but 60 per cent of the power used by the standard cars.



Fort Dodge, Des Moines & Southern—Traveling Electric Crane Car

In the motorman's cab on each of this company's cars is a neatly printed sign reading "Safety before speed." This is a part of a general campaign for safer and better train service which has been introduced by the new management. Along the right-of-way speed control signs have been placed at approaching hazardous curves and "resume" speed signs have been placed at the opposite ends of the hazardous ter-

ritory. These "slow" and "resume" speed signs are made of wood, substantial in design and painted yellow and black for the "slow" indication and green and black for the "resume" speed indication.

LOCOMOTIVES

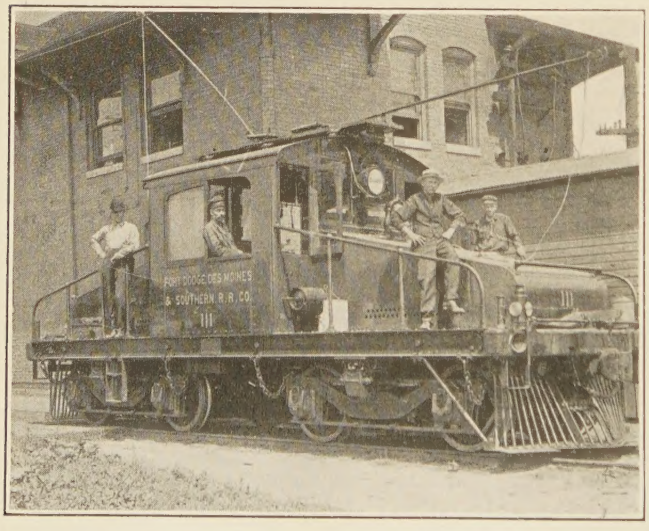
The freight traffic is handled entirely by electric locomotives, of which the company has seven. They weigh 85,000

Fort Dodge, Des Moines & Southern—Snow Drift at Ankeny, Jan. 15, 1912

lb. each and are all for 1200-volt multiple-unit service and of all-steel construction. Five of these are of the new type illustrated, and two originally built by the Baldwin Locomotive Works for 600-volt service have been rebuilt and re-equipped. Three other 600-volt locomotives were used for yard service during the 1200-volt electrification work.

The five locomotives, as will be seen by the accompanying illustrations, are similar in appearance to standard General Electric freight locomotives. As a matter of fact the greater part of these equipments is standard apparatus designed for 600-volt service with only such modifications as are demanded by the adoption of 1200 volts. The trucks are of the rigid bolster equalized type and the weight of the locomotives is carried on a double equalizer yoke which rests upon the journal boxes.

The motor equipment of each locomotive consists of four GE-206-A motors, which are rated at 100 hp each. They are geared to the wheels with a reduction of 3.82. With



Fort Dodge, Des Moines & Southern—Side View of 600-1200-Volt Locomotive

this equipment each locomotive develops a drawbar pull of 10,600 lb. at a speed of 14 m.p.h.

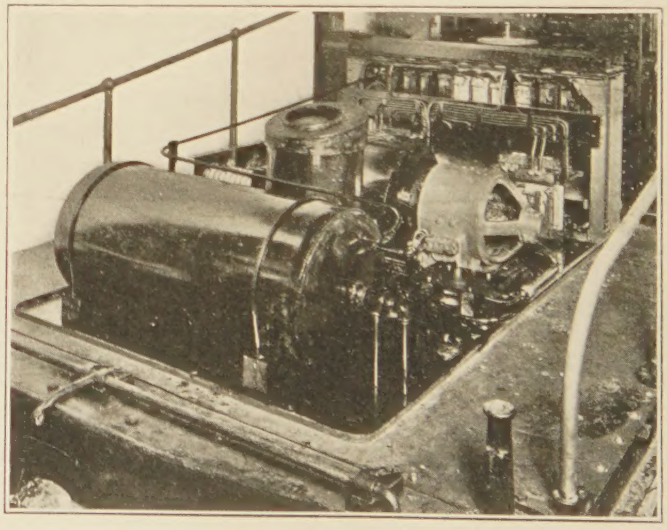
The electrical equipment is designed to permit a sufficiently large current being drawn to slip the driving wheels before a dangerous overload is reached. It is of interest to note that these motors are arranged for forced ventilation, a motor-driven blower being furnished to supply the air. The air compressor, which is of the CP-30 type, has a piston displacement of 35 cu. ft. per minute when pumping against 90 lb. reservoir pressure.

The control provides for the operation of the motors up to their maximum speed on both 600 volts and 1200 volts. A dynamotor is provided to furnish the 600-volt current for the control circuits when the locomotive is operating on the 1200-volt trolley. The master controllers are of the non-automatic type and all of the contactors are of the standard M type of equipments for 600 volts, with the contacts and blow-out coils insulated for 1200 volts.

The following table will give the principal data concerning these locomotives:

Length inside of knuckles	31 ft. 1 in.
Length over cab	27 ft. 0 in.
Height over cab	11 ft. 9 in.
Height with trolley down	12 ft. 8 in.
Width over all	9 ft. 6 in.
Total wheelbase	22 ft. 4 in.
Rigid wheelbase	6 ft. 10 in.
Weight electrical equipment	28,600 lb.
Weight mechanical equipment	53,400 lb.
Weight, total	85,000 lb.
Body construction	All steel, channels, plates and angles
Underframe	10-in. channels
Body bolster	Two plates, 17¾-in x 1-in. steel
Trucks	Equalized, built-up rigid bolster
Wheels	36-in. rolled steel
Truck bolsters	Steel castings
Springs	36-in. half elliptic, 4-in. x ⅜-in. plates
Journals	5½ in x 10 in.
Motors	Four GE-206-A
Gears	65 teeth, forged rim GE-grade F.
Pinions	17 teeth, forged GE-grade F.
Control	Type M, multiple unit
No. of steps	1200 volts; 6 series, 4 series parallel 600 volts; 6 series parallel, 4 parallel
Maximum tractive effort (with sand)	24,000 lb.
Corresponding tractive coefficient	30 per cent
Tractive effort at one hour motor rating	10,600 lb.
Corresponding tractive coefficient	13.3 per cent
Tractive effort continuous	8000 lb.
Corresponding tractive coefficient	10 per cent
Air brakes	Combined, straight and automatic
Air compressor	GE CP-30 35 cu ft. per minute
Brakeshoes	Flanged cast iron
Coupler	MCB
Pilots	Vertical round iron bars
Headlights	G. E. luminous arc
Sanders	Double end, pneumatic
Trolley	Two, U. S. 13
Bell	Composition casting, 56 lb.

The lightning arresters are of special interest as they are 1200-volt aluminum-cell arresters furnished with a balancing resistance, vacuum gap, charging tube and fuse. Each arrester is inclosed in a substantial wooden box located on the locomotive floor, and the connection to the



Fort Dodge, Des Moines & Southern—End of Locomotive with Casing Removed

trolley runs directly from the trolley base on the roof to the arrester through a copper tube. The active part of these arresters consists of five aluminum electrolytic cells connected in series, and the balancing resistance consists of a high resistance connected in parallel with the cells. Its function is to maintain a uniform potential across each individual cell. The vacuum gap is an open circuit con-

nected in series with the cells and is to prevent a continuous leakage of current. This gap is inclosed in a partial vacuum and the flash-over point which determines the potential at which the cell discharges can be accurately determined by adjusting the pressure of this air gap. Generally the vacuum is adjusted for a flash-over point of approximately 30 per cent above the operating voltage. The charging tube is partially filled with mercury and bridges the vacuum gap. The occasional closing of the circuit through this tube which will be produced by the ordinary vibration of the locomotive when running is sufficient to keep the cells charged and in good condition.

The lighting of the interior of the locomotive is accomplished by five 16-cp, 120-volt standard series railway lamps and two gage lights. These latter are connected in the headlight circuits. Two of the five cab lights are in portable lamp holders provided with 25 ft. of flexible cable. The headlights, which are luminous-arc type, are always operated at 600 volts.

The blower set for cooling the main motors and dynamotor consists of a No. 2 multivane Sturtevant fan, driven by a standard CVC series-wound, 600-volt d.c. motor of approximately 3-hp capacity when running at 1850 r.p.m. This fan is capable of furnishing 2100 cu. ft. of air at a pressure equivalent to 3 in. of water at the blower.

TRAIN OPERATION

Train service is conducted on this road under the American Railway Association code. Northbound trains are superior to southbound trains of equal class. The northbound trains are made superior because of the three northern terminals, Fort Dodge, Rockwell City and Ames, contrasted with one southern terminal, Des Moines. Thus, if the dispatching system is out of order the trains can reach the northern terminals without undue delay. Many of the trainmen in the passenger and freight service were in the steam service before the electrification.

ENGINEERING

The work of rehabilitating and re-equipping the Fort Dodge, Des Moines, & Southern Railroad was executed under the supervision of H. U. Wallace, consulting engineer, Chicago, and W. H. Crooks, general manager, Boone, Ia.

RECENT DECISION IN THE PEORIA WATER WORKS CASE

Judge A. L. Sanborn, of the District Court of the United States for the Northern District of Illinois, Eastern Division, handed down a decision May 13 in the case of the Peoria Water Works vs. the Peoria Railway Company. The judge refers to the decision rendered by the special master April 13, 1901, and published in the STREET RAILWAY JOURNAL for June 22, 1901, to the full report of the master published in the ELECTRIC RAILWAY JOURNAL for July 3, 1909, and to his own decision rendered Sept. 20, 1910, and reported in the ELECTRIC RAILWAY JOURNAL for Oct. 29, 1910. In his last decree Judge Sanborn orders the Peoria Water Works to allow the railway company, at its own expense, to inspect the water pipes, hydrants, etc., to determine whether any injury was being caused by electrolysis. He also stated that at the expiration of a year he would listen to any request on behalf of the railway company to be allowed to use a drainage return circuit system in connection with the water pipes of the water works company.

All the street railways in Valparaiso, Chili, have had women conductors since the war between Chili and Peru. The cars are double-decked. The fare is 2 cents to ride inside and 1 cent to ride on the top of the cars. There are 25 miles of electric railway in Valparaiso.

A REVIEW OF HEAVY ELECTRIC TRACTION IN EUROPE

At a meeting of the American Institute of Electrical Engineers held at Schenectady, N. Y., May 17, 1912, C. E. Eveleth, General Electric Company, presented a paper entitled "Some Impressions of the Electric Traction Situation in Europe." Perhaps the most fundamental difference from American practice was in the relative magnitude of the drawbar pulls required for handling either freight or passenger trains. The ordinary European drawbars were designed for normal working pulls of 12 tons to 15 tons and for a breaking strength of approximately twice these values. Some American drawbars had shown normal working values of 40 tons to 50 tons and breaking strengths of 100 tons to 150 tons. In Europe there were practically no automatic couplers, as the cars were generally coupled by links with turnbuckles. The train limitations were such that with a liberally powered locomotive not more than 60 tons could be utilized on the drivers, whereas Americans did not hesitate to couple two locomotives to secure a total weight of about 200 tons on the driving axles at the head end of the train, as in the Detroit River and the Great Northern electrifications. European locomotives with plate-frame structures were made to withstand end strains of about 30 tons. In this country the locomotives were designed for end strains of approximately two and a half times the locomotive weight. These differences naturally lead to radically different types of mechanical design. The lower tractive effort at starting demanded of European locomotives resulted in equally radical differences in the electrical design of the motors.

ENGLAND

Mr. Eveleth said that studies were being made for the electrification of the steam suburban traffic in several large cities like London, Manchester and Liverpool. Suburban electrification had been very much affected by the introduction of motor buses and the extension of surface tramways. The London, Brighton & South Coast Railway's loop from London Bridge to Victoria Station offered an interesting example of the benefits of electrification. About seven or eight years ago, when this division was operated by steam, about 8,000,000 tickets a year were sold. Owing to the development of surface transportation competition, these sales dropped to about 3,500,000 tickets per annum. However, since the single-phase electrification was completed about two years ago, the ticket sales have increased so rapidly that they are now about 9,000,000 per annum.

Mr. Eveleth thought that the general consensus of engineering public opinion in England seemed to indicate a decided preference for direct current for the English conditions. The London, Brighton & South Coast line, of course, was an exception. No operating costs on the Brighton system had been made public, and the manufacturer appeared to be still interested in the experimental development of the motors and control, so that all maintenance was not yet entirely in the hands of the railway. Several of the electrifications under consideration were being studied on the basis of 1200 volts direct current and higher. One manufacturer had already built a 3500-volt d.c. locomotive, energy for which was furnished by a single-commutator 3500-volt machine.

HOLLAND

The great extent of the freight transportation by canal in Holland made it hardly likely that any considerable electrification of steam railroads would soon take place there. The single-phase electrification between Rotterdam, Haag and Scheveningen had been taken over by the parallel steam railroad. The schedules on this line were not severe, and the service called for an average of about one stop in 10 miles. The maintenance costs were said to be rather high and no immediate extensions were contemplated.

FRANCE

Considerable study was going on in France, but as yet there had been no large installations. The engineers of the Paris-Mediterranean-Lyons Railway had developed a locomotive which took power from a single-phase trolley and operated d.c. motors on the axles, the current for these motors being transformed by a synchronous commutator known as a permutator. In its present state this locomotive was purely experimental. The single-phase system was represented by one or two small tramway lines and by some undertakings which were being carried out by the Midi Railway. The latter company had purchased five different single-phase locomotives from as many manufacturers for experimental operation in Southern France on sections involving heavy grade haulage with regenerative braking. Up to March, 1912, three locomotives had been delivered. The electrifications were being carried out under government subsidies, without which they would hardly be justified, as there was little traffic. Several of the lines to be operated electrically had not yet been built, and it would probably be several years before the locomotives were in active operation. The 2400-volt, three-wire d.c. system at Mure was now being extended with a trolley having 2400 volts between the overhead conductor and the track. The most serious undertakings contemplated in France were those connected with the electrification of the steam railroads at Paris, although the State Railways and the Paris-Orleans Railway contemplated the extension of their electric suburban lines with the d.c. third rail. Mr. Eveleth found that the engineers of the French State Railways believed that direct current was cheapest in first cost and operation for any of their lines upon which electrification was desired.

SWITZERLAND

The Simplon tunnel three-phase electrification appeared to be successful in every way. At first great trouble was experienced from insulation breakdowns on both motors and transformers due to condensation when the cool locomotive passed into the tunnel where the temperature is about 115 deg. Fahr. because of hot springs. This condensation caused every portion of the electric locomotive to be drenched with water. This trouble was now avoided by warming the locomotives over heated pits at the terminal before they enter the tunnel.

In making studies for the electrification of the St. Gotthard tunnel the engineers of the Swiss government found that the single-phase system was about 20 per cent less in first cost than the three-phase system and about 33 per cent less than direct current. This difference between the installation cost of direct current and single-phase was much greater than had ever been found in any analysis of conditions in the United States. Some of the fundamental assumptions of the Swiss analysis were as follows: Cost of single-phase d.c. locomotives essentially the same; each substation equipped with motor-generator sets and complete installation of spare units; each substation equipped with storage batteries; substations located half the calculated required distance apart to insure continuity of service in case of disaster to any individual station. Voltage regulation conditions were taken to be considerably better than those generally adopted in America. It was estimated that the direct-current and single-phase locomotives would have essentially the same maintenance costs, and that these costs would be about one-half of those required for steam locomotive upkeep.

ITALY

The most important electrifications in Italy were the three-phase installations by the government at Valtellina, Mount Cenis and the Giovi tunnel near Genoa. Electric traction applications in Italy had been made on mountain grades and those contemplated in the immediate future involved similar conditions. The work had proved entirely satisfactory to the government both as regards installation and operating costs. The extensions now contemplated would involve the purchase of several hundred locomotives within the next two years. The electric locomotives on the Genoa division would soon haul about 15,000 freight cars a day, thus making it the heaviest section of electric traction on the Continent. A most extraordinary and perhaps unexpected saving had been found in the reduction of rail wear. When the Giovi tunnel was operated entirely by steam the up-grade rail lasted about twelve years and the down-grade rails about three and one-half years. Apparently the restricted axle movement with brakes on the descending steam train resulted in a scouring action on the railheads. At any time during steam operation fresh deposits of metallic dust from the rails and brakeshoes were to be seen on the ballast. Electric service for one and a half years indicated that the down-grade rail would last as long as those on the up-grade tracks. This saving of practically two sets of rails in twelve years was equivalent to approximately the total interest on the power plant and transmission system. Allowance was now being made by the Italian engineers for this factor in making electrification studies for tunnel conditions similar to those at Genoa. Mr. Eveleth thought that this character of saving had not been recognized in America, probably due to the fact that practically all American tunnels with grades are single track, and the difference of wear between the ascending and descending track with the steam service had not been recognized.

Regeneration had also affected a saving of 17 per cent in coal. When the entire division was electrified the possible saving in coal would be much higher. The difference in the energy represented by the present saving and the anticipated saving was now wasted in the water rheostats at the power house, which were adjusted to dissipate energy in excess of that which could be utilized by ascending trains. The Italian engineers were enthusiastic over the three-phase system for their conditions, and the results obtained certainly warranted their enthusiasm.

GERMANY

The most important developments in Germany were in connection with the state railroads. The government engineers believed in the economic advantage of electrification which permitted the use of inferior grades of brown coal which were not fit for ordinary locomotive service. Up to the present time all of their work had been of an experimental character, but this had been combined with the commercial operation of the Hamburg-Blankenese-Ohlsdorf line, on which multiple-unit motor-car trains were used.

Referring to the Dessau-Bitterfeld locomotives, Mr. Eveleth found it interesting that the tendency in Germany was to make a single motor do as much as possible by coupling it to several driving wheels, while in the United States the tendency was to have a multiplicity of small, higher-speed motors connected in some way to the wheels through gearing. About six years ago the German government engineers had decided upon the standardization of single-phase in the belief that it was best adapted to German conditions, which required uniformity, chiefly for military reasons. The relative amounts of operating expenses compared with other systems had apparently not been investigated. All of the principal German manufacturers were now taking very active interest in the development of d.c. equipment for 1000 volts and more. There were a dozen or more gas-electric cars in passenger service on the Russian frontier and it was understood that about 100 more were soon to be built.

SWEDEN

The experimental lines built in Sweden some years ago had been dismantled, but the government had recently contracted for the equipment of one of its Lapland lines to transport iron ore from Kiruna to Riksgränsen. The Swedish engineers were also engaged in the development of gasoline-electric and Diesel electric car equipments for general use throughout the kingdom.

Valuations of Chicago Elevated Railways

Figures Submitted in Appraisals by Prof. George F. Swain, Representing the Companies, and by a City Committee—Discussion on the Treatment of Depreciation in Each Report

The principal figures of the valuations of the Chicago Elevated Railways were published in last week's issue of the ELECTRIC RAILWAY JOURNAL. To supplement these, detail figures and summaries of the explanatory statements made in connection with the two valuations are published herewith.

REPORT OF PROF. GEORGE F. SWAIN

Prof. George F. Swain, who made the report on the valuation for the companies, said in part in his letter to Britton I. Budd, president of the Chicago Elevated Railways:

"It is, I think, generally admitted that in making an estimate of the present value of a property the price of elements which fluctuate in price up and down in comparatively short periods should not be taken as of the precise date of the valuation but should be what may be considered fair, average prices, under normal conditions, for a series of years. If the valuation were made at a time when prices of materials and labor were abnormally high, it would obviously be unfair to assume this high price in estimating the values of the property, as it would result in too high a valuation. Similarly, it would not be fair to take the prices at the date of the valuation if they were then abnormally low.

"Moreover, in judging as to what is a fair price, it is not fair to base a judgment on prices which afford either too high or too low a profit to the contractor. A company will sometimes take a contract at a price which affords no profit, for the sake of keeping its employees at work and maintaining its organization, or it may even take a contract at a loss for that purpose or perhaps in order to prevent a competitor from obtaining the contract. A fair, average price, under normal conditions for materials and for labor, including a fair profit to the contractor, seems to be the only just basis, for it cannot be assumed that if the property were to be reproduced to-day it could be done on any other basis.

"I submit Table I, published herewith, showing the valuation made for you by A. L. Drum & Company, the valuation given to me by the Harbor & Subway Commission and the valuation which seems to me to be fair and just to all parties.

LAND

"The land valuations made by Mr. Trainer and Mr. Donnersberger I do not feel competent to criticise. I have talked with Mr. Trainer a number of times during the progress of the work, and I believe that he has proceeded on right principles.

FOUNDATIONS

"The most essential difference between the estimates of A. L. Drum & Company and the estimates of the commission lies in the charge which should be made for the expense of taking care of sub-surface and aerial obstructions belonging to other public utilities, such as gas and water pipes, sewers, manholes, sidewalks, curbing, curb walls and conduits, as well as telephone and telegraph wires. The commission consider that it has made ample allowance for this. After talking with contractors, however, both in Chicago and in Boston, in my judgment A. L. Drum & Company's estimates are more nearly correct. If an estimate were to be made to-day of the cost of building these foundations, the cost of interfering with these utilities would have to be estimated by using judgment, and in addition to such estimate an allowance for contingencies would have to be made, as is usual in all engineering estimates. The proper allowance to be made in the estimate is largely a matter of judgment, and I can only say that the figure given in my estimate, which is a little less than that of A. L. Drum & Company, represents, in my best judgment, a fair estimate for these foundations. I may say, also, that I do not agree with some of the unit costs, such as those for excavations and for cement, which the commission has used.

"I have not depreciated the values of these foundations, although it is quite probable that they are in reality slightly depreciated, or not quite as good as new. This depreciation, however, is so slight that I have not made any allowance for it.

TABLE I.—VALUATION ESTIMATES SUBMITTED IN REPORT OF PROF. GEORGE F. SWAIN.

	Estimate of A. L. Drum & Co.				Original Estimate of Commission. —Subject to Change.—		Estimate of Prof. George F. Swain.	
	New (*a*).		Depreciated (*b*).					
Item.	Amount.	Percent. Included.	Amount.	Percent. Included.	New (*c*).	Depreciated (*c*).	New (*d*).	Depreciated (*d*).
2. Foundations	$2,800,194	5	$2,800,193	5	$1,926,605	$1,926,605	$2,600,000	$2,600,000
3. Superstructure	14,885,725	5	14,720,847	5	10,200,048	8,835,278	12,884,132	12,584,000
4. Track work	2,513,324	15	1,825,994	..	1,802,376	922,826	2,347,431	*e*1,656,989
4a. Pavement	262,200	5	196,650	5	251,400	196,650	251,400	*e*188,550
5. Third rail	396,551	15	288,908	15	309,332	156,289	329,700	242,824
6. Special work	208,775	10	156,583	10	108,272	70,733	189,775	*e*142,350
7. Storage yards, including track, special work and interlocking	632,808	15	505,504	..	351,587	215,338	550,270	*e*385,189
8. Interlocking plants and block signals	472,803	10	354,602	10	394,839	297,816	412,000	309,000
9. Power stations	4,813,416	10	3,824,104	10	3,586,149	2,318,662	4,166,325	3,274,876
10. Substations and batteries	1,975,767	10	1,675,659	10	1,484,867	1,089,194	1,753,458	1,476,734
11. Transmission lines overhead trolley and bonding	1,529,619	15	1,389,726	15	1,269,858	979,459	1,360,104	1,238,500
12. Rolling stock	11,205,966	5	10,144,346	5	9,700,887	7,790,502	10,098,652	8,106,134
13. Stations, buildings and platforms	2,717,377	10	2,598,527	10	1,784,887	1,441,903	2,250,000	2,160,000
14. Office fixtures, tools and supplies	359,000		269,250	..	359,000	269,250	359,000	269,250
Total without real estate and rights-of-way, or overhead charge	$44,773,524		$40,750,892		$33,219,775	$26,354,217	$39,552,247	$34,634,396
Overhead on physical	8,954,705		8,954,705				11,865,674	11,865,674
Total without real estate and rights-of-way	$53,728,229		$49,705,597				$51,417,921	$46,500,070
Real estate and rights-of-way (J. Milton Trainer's figures)							44,551,498	44,551,498
Brokerage on real estate and rights-of-way, 5 per cent.							2,227,575	2,227,575
Total							$98,196,994	$93,279,143

(*a*) Percentages included represent cost of construction organization, including engineering, superintendence, inspection, accounting, office and engineering supplies, etc.
(*b*) Percentages included for cost of construction organization, etc., but depreciated.
(*c*) No percentages included for cost of construction organization, etc.
(*d*) Percentages for cost of construction organization, etc., included in item overhead on physical.
(*e*) No depreciation on labor items.

STEEL

"With reference to the steel structure, the valuation is almost entirely a question of the price per pound, erected and painted, at which the steel shall be put in. At this point there is a wide divergence between the commission and myself. A. L. Drum & Company estimated the steel at 4 cents a pound, while the commission has used the very low figure of 3 cents per pound. While I think the estimate of A. L. Drum & Company is a little high, I am convinced that the estimate of the commission is entirely too low and that it does not represent a fair valuation. I have used a price of 3.50 cents per pound, which I believe will be admitted by most engineers who know the real cost of steel work to be fairly conservative. Indeed, I think an even higher figure could be justified for work of this character.

"C. H. Cartlidge, engineer of structures of the Chicago, Burlington & Quincy Railroad, an engineer of high standing and long experience in work of this kind, has at my suggestion made a thorough examination of the structure, and my figures for depreciation are based on the result of that examination. I do not know of a single valuation of steel structural work for a railroad which has been put in at so low a figure as that used by the commission, and I doubt very much if such a figure has ever before been used.

TRACK

"I submitted the estimates of A. L. Drum & Company to C. T. Fernald, engineer of the Boston Elevated Railway, an engineer of experience on work of this very character. Mr. Fernald reports to me that the unit prices used by A. L. Drum & Company for material are almost identical with those paid by the Boston Elevated Railway for rails and fittings, while for timber they are very much lower than those paid by the Boston company. I am convinced that the estimate of A. L. Drum & Company for the cost of reproduction new is conservative. Indeed, if the higher price of timber were taken, as I think it should be, a higher figure would be justified. I have, therefore, used essentially the estimate made by A. L. Drum & Company, modified in some respects.

"With reference to the depreciation of track, I have not depreciated the labor involved in the laying of track or decking, on the assumption that when the track and deck have to be renewed, this labor will be furnished by the railroad company and its cost charged entirely to operating expense. This is in accordance with the methods prescribed by the Interstate Commerce Commission, which seem to me to be the best and safest methods to use.

PAVEMENT

"This is a small item, and I have adopted the estimate of A. L. Drum & Company. I understand that the commission has made no estimate of this item.

THIRD RAIL, SPECIAL WORK, STORAGE YARDS, INCLUDING TRACK, SPECIAL WORK AND INTERLOCKING

"I have somewhat modified the estimates of A. L. Drum & Company and where practicable I have not depreciated labor. These items are not very large, and I am convinced that they are essentially conservative.

INTERLOCKING PLANTS AND BLOCK SIGNALS

"The Harbor & Subway Commission has had this item appraised by F. G. Ewald, engineer of the Illinois Railroad & Warehouse Commission. I understand that Mr. Ewald has agreed to a slight modification of his figures, which are very close to those of A. L. Drum & Company, and I have taken an intermediate figure.

POWER STATIONS, SUBSTATIONS AND BATTERIES

"I submitted the estimates of A. L. Drum & Company and the original estimates of the commission to Stone & Webster, in Boston, a well-known and most reliable engineering firm, engaged in the construction and management of railroads and other public utilities all over the United States. The figures given me by Stone & Webster agreed almost exactly with the estimate of A. L. Drum & Company for the cost of reproduction new. I feel very confident that these figures are reasonable, and I have therefore used the revised figures of A. L. Drum & Company.

TRANSMISSION LINES, OVERHEAD TROLLEY AND BONDING

"There is only a slight difference between the figures of the commission and those of A. L. Drum & Company regarding this item, and I have adopted the latter.

ROLLING STOCK

"In my judgment, the prices for rolling stock given in the estimate of A. L. Drum & Company are somewhat high. The valuations made by the expert for the commission seem to me more reasonable, and I have adopted them with a few modifications where they seemed too low or inconsistent.

STATIONS, BUILDINGS AND PLATFORMS

"This is the most uncertain item on the list, involving the large number of station buildings of various construction scattered along the lines of the railroad. The commission has largely reduced the value of this item. I have adopted a figure about 10 per cent below that of A. L. Drum & Company.

OVERHEAD CHARGES

"The estimate of A. L. Drum & Company includes, as stated, a certain percentage for engineering and inspection in each item, varying, however, with the different items, from 5 to 15 per cent. To the sum of the items 20 per cent is added to cover the remaining overhead expenses, namely, interest during construction, financing, brokerage, organization, legal, development expenses and contingencies. It has seemed to me that a total overhead charge of 35 per cent for a project of this kind would be reasonable. This charge would cover promotion, organization, engineering, legal and real estate charges, administration, taxes during construction, insurance, interest during construction, brokerage and contingencies.

"All of these charges represent actual money which must be paid out, in order to produce the property in its present condition. They are not intangible, like 'going value,' 'franchise value' or 'good will.' They should, therefore, all be included in a physical valuation.

"Regarding the total charge to cover all these items, I asked the opinion of Stone & Webster, and they informed me that in their opinion 35 per cent would not be too high a charge. In order to be conservative I have in my final figures used a total of 30 per cent.

"In my estimate I have not depreciated these overhead charges. I believe this is proper in estimating the present value of a going concern.

"The above valuation does not cover the franchise value, that is to say, the present value of the future earnings up to the expiration of the franchise. Neither does it cover loss of earnings in early years, nor the value of the traffic agreements, leases and contracts which you have with other companies, such as the Aurora, Elgin & Chicago Railroad and the Chicago, Milwaukee & St. Paul Railway. No account has been taken of the physical property of the leased branches of the South Side Railroad, the earnings from which help to swell the total earnings, and which are leased for a period which extends beyond the termination of the franchise so that for all practical purposes they are as good as owned by you. Neither has any account been taken of abandoned or superseded property or of cash on hand.

"These intangible values should be added to the present physical value stated above in order to obtain the present total value of the properties.

"In making out this table, I have inserted the actual figures given by A. L. Drum & Company. These figures, however, include percentages varying with the different items to cover engineering, inspection, etc. The figures given for the estimatets of the commission and for my own estimate are all without any overhead charge.

DEPRECIATION

"If the object is to determine the actual present value of

.he materials constituting the physical property, this is a concrete problem and is not to be determined primarily by any formula, but by careful inspection. The actual condition and wear of each element must be measured. On an elevated road, however, using multiple-unit cars, there is no reasonable prospect of any material increase in the weight of rolling stock. Under these circumstances, if the steel has been kept protected from corrosion, it should last forever. Its depreciation is not measured by years, but by the actual corrosion which has taken place. Actual depreciation, then, is a question of maintenance and wear.

"Taking now a single element not composed of elements having various lengths of life, say a rail whose actual depreciation depends upon how much it has worn down, this actual depreciation, under constant traffic, will be determined properly by the straight-line method, using the life which is the actual life under the traffic to which it is exposed. This actual depreciation subtracted from its value new will give the actual present value. But this present value is not necessarily the proper price to be paid for the rail, the reason being that, for actual purposes, as a part of a going concern, the rail is as good as new and no expenditure will have to be made to renew it, for some time to come.

"Now, the owner of a property, if he has a depreciation fund calculated on the sinking fund basis, for every element of value, is always possessed of a property as good as new. He should not sell the property, including the sinking fund, for any less than its cost new. Likewise, the purchaser who pays the cost new and receives the property and the sinking fund, or who pays in cash the cost new less the sum in the sinking fund and receives the property without the fund, is in as good a position as if he had built the property new. Its different parts will be renewed from time to time, and he has the funds for renewal provided for.

"It would seem, therefore, that the sinking fund depreciation would be the proper method to use in fixing a price at which a property could be taken by the city. I have used this method, so far as applicable.

"In Boston the engineers of the Elevated Railway Company, in making their estimates for a double track line, use, in general, $100 per linear foot, which they think is a fair cost. This includes structure, foundations, track system, including third rail and electrical equipment, but excluding signals. It does not include passenger stations, switch towers, signals, equipment, carhouses, repair shops, or power stations.

Table II.—Valuation Report of City Committee on Elevated Property Inside the City Limits

		Cost to Reproduce New	Present Value
1.	Real estate and right-of-way	$16,248,864	$16,248,864
2.	Foundations and public utilities	2,230,841	2,230,841
3.	Structural steel	11,127,025	9,609,759
4.	Track work	2,250,697	1,248,333
4a.	Pavement	262,200	196,650
5.	Third rail	313,257	153,344
6.	Special work	176,293	118,351
7.	Storage yards, including track, special work and interlocking	518,709	340,568
8.	Interlocking plants and block signals	388,399	292,003
9.	Power stations	3,962,672	2,570,356
10.	Substations and batteries	1,475,853	1,180,777
11.	Transmission lines, overhead trolley and bonding	1,142,050	946,841
12.	Rolling stock	9,700,887	7,790,502
13.	Stations, buildings and platforms	1,738,640	1,397,590
14.	Office fixtures, tools and supplies subject to inventory	359,000	269,250
Taxes during construction		150,000	150,000
		$52,045,387	$44,744,029
Add 18 per cent overhead charges		9,368,170	8,053,925
		$61,413,557	$52,797,954

"In New York, recent prices given me by the chief engineer of the Interborough Rapid Transit Company, George H. Pegram, based on recent extensions of its elevated lines, indicate a cost of $100 per linear foot, double-track line, and $127 per linear foot for three tracks. This includes the same items which are named above as included in the Boston estimate, together with administration and stations.

"Using the New York figures, we obtain the following estimate of cost for the various elements of this line: 282,000 ft. at $100 equals $28,200,000; 78,500 ft. at $27 plus 38,000 ft. at $27 equals $3,145,500; 4,300 ft. at $73 equals $313,900; total, $31,659,400.

"My final estimates for the cost of reproduction of the elements included in the above figures (including surface tracks), namely, items 2, 3, 4, 4A, 5, 6, 7, 8, 11 and 13, equal $23,174,812 plus 5 per cent, or $1,158,741, a total of $24,333,553.

Table III.—Valuation Report of City Committee on Elevated Property Outside the City Limits

		Cost to Reproduce New	Present Value
1.	Real estate and right-of-way	$241,864	$241,864
4.	Track work	73,249	44,868
5.	Third rail	5,226	4,755
6.	Special work	9,664	6,765
7.	Storage yards, including track special work and interlocking	25,122	19,458
10.	Substations and batteries	176,172	147,618
11.	Transmission lines, overhead trolley and bonding	50,316	43,941
13.	Stations, buildings and platforms	46,247	44,313
		$627,860	$553,582
Add 18 per cent overhead charges		113,015	99,645
		$740,875	$653,227

"You will note that my total for these items is considerably less than that indicated by the New York figures. This comparison, therefore, as well as every other comparison which I have been able to make, and the judgment of every engineer whom I have consulted on special parts of this appraisal, indicates that my figures are conservative. I believe that they are below the actual fair cost of reproduction at the present time."

VALUATION OF CITY COMMITTEE

The members of the city valuation committee were J. J. Reynolds, John Ericson, E. C. Shankland and George Weston. W. J. Shanks was secretary of the committee. In their letter addressed to the local transportation committee of the City Council of Chicago, they say, in part:

"As Tables II and III, published herewith, show, the valuations have been set up in such a way that the physical properties of the elevated corporation inside the city limits and similar properties outside the city limits are kept separate.

"These valuations include also such overhead charges as, in the opinion of this committee, are allowable from an engineering viewpoint, but they do not include promotion expenses or brokerage or construction capital. Nor do they include any intangible values, such as claims for unexpired franchises.

OBTAINING INVENTORIES

"The first formal meeting of the valuation committee was on Dec. 27, 1911, all members, including Professor Swain, being present. It was agreed that the elevated companies should furnish inventories of physical property. Arrangements were at once made with President B. I. Budd, of the Chicago Elevated Railways, to furnish the inventory data.

"The submission of detailed inventories of physical property occupied all of January, 1912.

VALUATION EXPERTS EMPLOYED

"Meanwhile, the members of the valuation committee representing the city availed themselves of the services of valuation experts on special items, as follows: Real estate, Joseph Donnersberger; structural steel, William M. Hughes; rolling stock, M. K. Northam; interlocking plants and signals, F. G. Ewald; foundations, F. W. Watts.

"The companies also employed some valuation experts outside their own enginering staff. J. M. Trainer was assigned the task, as the companies' representative, of making real estate valuations. He and Mr. Donnersberger, the city's representative, worked in conjunction, with the understanding that they would endeavor to reach an agreement before submitting final figures to the committee.

COMPLETION OF INVENTORIES

"The companies on Feb. 1 submitted to the committee a practically complete inventory of their physical properties, with the exception of real estate.

COMPANIES' REPRESENTATIVE WITHDRAWS

"The differences of opinion regarding methods of valuation and the results following the employment of different proposed methods were pronounced from the beginning. Professor Swain, as the companies' representative, took exception to many findings by the majority of the city's representatives on the valuation committee. Much time was consumed in a fruitless effort to reconcile these conflicting views. On April 30 Professor Swain notified the other members of the valuation committee that he would withdraw from further conferences and would submit an independent report as the companies' representative.

ANALYSIS OF VALUE

"The valuation presented was based on the cost of reproduction of the entire elevated railway system under consideration as per inventory of Jan. 1, 1912. The inventory was checked carefully.

"It has been assumed that four years' time would be required to reproduce the system and the committee has made an analysis of costs, prices and wages covering a corresponding period of years, as well as improved methods of work and manufacture, and in applying prices has been governed by such analysis.

DEPRECIATION

"There are three methods used in calculating depreciation of a plant at any time in its life—the straight-line or constant-rate method, the sinking fund method and what might be called the individual judgment method.

"The first method is based on the assumption that depreciation takes place at a constant rate during the entire time of the plant's life. This method represents the actual physical depreciation of a property for the life assumed.

"The sinking fund basis method contemplates depreciation as conforming to the growth of a sinking fund created by annual instalments and which, with interest compounded at the end of the useful life of the property, will equal the original cost of the property less salvage.

"The third or individual judgment method follows no fixed rule, but is based on individual judgment and a consideration of local and other conditions.

"The valuation committee has come to the conclusion that the straight-line or constant-rate method is the proper one to use. In other words, if the useful life of any structure or principal part is taken to be twenty years, one-half of its original value has been depreciated by ten years' service.

"Thus, by applying the sinking fund method to, for instance, the steel structure the railway companies have arrived at a depreciation of the same, for an average period of about fourteen years, as only about 1.2 per cent. while the valuation committee by applying the straight-line or constant-rate method finds the depreciation on steel structure about 14 per cent.

REAL ESTATE

"The general basis for making real estate valuations was agreed upon before any work was undertaken.

FOUNDATIONS

"The foundations of elevated road structures, being almost entirely below the surface, could not be measured accurately. Plans and quantities submitted by the railway companies were checked as carefully as possible and accepted as correct. The prices of materials and other elements entering into foundation construction were determined and applied in the calculations.

STRUCTURAL STEEL

"The inventory of this item as presented by the railway companies has been checked carefully. Prices, both past and present, of steel construction on elevated roads and on other structures were analyzed fully by the valuation committee and a cost figure arrived at that is believed to be fair and liberal.

TRACK WORK, SPECIAL WORK AND STORAGE YARDS

"The estimated costs for reproduction new of the items enumerated above were first determined by the valuation committee. Afterward the various details making up these estimated costs were considered in joint conference with representatives of the railway companies and agreed to. The items of power stations and substations were treated in the same manner as the above and similarly agreed to with the exception of one item, that of engines.

ROLLING STOCK

"A detailed inspection was made of the cars in each classification and a special examination made in order to ascertain that the equipment was in accordance with the specifications of the particular class. The reproduction value of each class of equipment was then determined, a reasonable allowance for freight, assembling, testing, etc., being included. The life of the various parts of the cars being variable, a special determination of the depreciation of the rolling stock was made, taking into consideration the scrap value remaining at the end of its life.

STATIONS AND BUILDINGS

"Bills of material of the structures contained in this item were taken off in detail from the plans submitted by the railway companies and prices covering a period of years were applied. All parts of a building except steel, which in this valuation is included in item No. 3, are higher, on account of labor, than they have been for several years.

OVERHEAD CHARGES

"Expenses of engineering, legal expenses, organization and administration, contingencies and interest during construction have been estimated at 18 per cent of the total cost. In addition there may have to be considered the items of promotion expenses and brokerage on construction capital. The two latter items are of a strictly financial nature and, in accordance with instructions, have been omitted by the valuation committee."

SUPPLEMENTARY LETTER

A supplementary letter was addressed to the Council committee by the city valuation committee. It said in part:

"The sinking fund curve method is purely a financial proposition and its application should depend upon what amount is finally determined as the proper amount the company may be permitted to issue securities upon.

"The cost new to reproduce the property to-day is undoubtedly the figure that the company would capitalize in the beginning, and it is only in conjunction with the figures for capitalization that the sinking fund curve method of figuring depreciation should be applied, and then its function would be to determine the amount of money which should be deposited in a sinking fund which, compounding at the agreed rate of interest, would equal at the end of the period of life assumed for each part the amount of the depreciation at the date of the inventory; and in addition provision should be made for the continuation of this fund by monthly or annual payments into a fund which, at the agreed rate of interest, would produce at the end of the life period, together with the fund established as mentioned above, an amount equal to the total depreciable value."

COMMITTEE ON CHICAGO VALUATIONS IN SESSION

The Chicago local transportation committee's sub-committee on valuations has been holding daily sessions in order to reconcile the differences regarding physical values. All sessions have been closed to the public and the committee has given particular attention to the method of determining real estate and right-of-way values.

Joseph Donnersberger, the expert on real estate values employed by the city, explained his method of arriving at values. J. Milton Trainer, the company's expert, also appeared before the sub-committee.

Executive Committee on the Pacific Coast

Visits to Oakland—Banquet in San Francisco on May 10—Reception in Portland—Visits to Vancouver and Seattle

The party on the private car "Advance" reached San Francisco May 9, as stated in the last issue of this paper. On Friday of last week the members of the party were the guests during the morning and afternoon of the San Francisco & Oakland Terminal Railroad and spent the day in Oakland and Berkeley. After a trip on the San Francisco Bay they inspected the shops and the line of the Key Route and had lunch at the Claremont Country Club, where Mayor Mott of Oakland and President F. M. Smith of the United Properties Company received the guests. The United Properties Company controls the Oakland Railways. Among those who were present at the reception were E. A. Heron, president; Dennis Searles, first vice-president; William R. Alberger, second vice-president and traffic manager; F. W. Frost, secretary; Angus Clark, assistant secretary; J. Q. Brown, chief engineer; John Ferrin, claim agent, and B. W. Fernald, auditor, all of the Oakland Traction Company and of the San Francisco, Oakland & San José Consolidated Railway.

The Mayor made the only speech at the luncheon. In the afternoon a trip was made to the adjacent country.

BANQUET AT SAN FRANCISCO

On the evening of Friday, May 10, a reception and banquet was given at the Palace Hotel in honor of the visiting officials by the local members of the American Electric Railway Association and the American Electric Railway Manufacturers' Association. The committee in charge of the banquet was composed of Messrs. Colby, of the Pierson & Roeding Company; C. L. Heise, of the Westinghouse Electric & Manufacturing Company; A. V. Thompson, of the General Electric Company; W. E. Amann, of the Galena Signal Oil Company, and Thomas Finigan, of the United Railroads of San Francisco. One hundred and fifty guests were present, including Mayor Rolph of San Francisco, Mayor Mott of Oakland, other members of both city governments and representatives of various civic bodies, etc. The toastmaster was Dr. Thomas Addison, of the General Electric Company. A list of the speakers with the toasts follows: "Welcome to San Francisco," by Hon. James Rolph, Jr., Mayor of San Francisco; "The Trans-Bay Allied Interests," by Hon. Frank K. Mott, Mayor of Oakland; "The Purpose of Our Trip," by Thomas N. McCarter, president American Electric Railway Association; "The Public We Serve," by Oscar T. Crosby, president Wilmington & Philadelphia Traction Company; "The Obligation of the Manufacturer," by Charles C. Peirce, member executive committee Manufacturers' Association; "The Corporation Dollar," by R. M. Searle, vice-president Rochester Railway & Light Company; "Good Night," by Wallace W. Briggs, assistant general manager of sales Westinghouse Electric & Manufacturing Company.

Mayor Rolph was called away by previous engagements before the speechmaking began and delegated his duty of welcoming the guests to the city to Supervisor Alexander Vogelsang, of the public utilities committee of the Board of Supervisors.

REMARKS OF PRESIDENT M'CARTER

President McCarter in his speech paid a tribute to Charles N. Black, general manager United Railroads of San Francisco. He said: "I want to put a local touch to my remarks on honest management of electric railway systems. Charles N. Black and I entered Princeton together when mere boys. For four years we were not only classmates but intimate personal friends, a relation which has continued to this day, though most of the time we have been at opposite ends of the continent. If what I have said of electric railway management is true generally, I have personal knowledge that it will be true in San Francisco as long as Charles N. Black manages this property. What I say of him is the tribute that love pays to worth." He also aroused great enthusiasm by declaring that although the present executives of railway associations cannot in such a matter bind their successors, yet there was a consensus of opinion among members of the party that the electric railway convention in 1915 should be in San Francisco. Prior to these remarks President McCarter said, in part:

"It is not to be denied that in many minds a feeling of prejudice toward electric railway companies exists. No doubt this is in large part due to the fact that in the early stages of the industry policies were adopted which would not in this enlightened day be tolerated for a moment. But, whatever may have been the case in the past, I am prepared to say that in the nearly ten years during which I have been connected with this business the men engaged in operating electric railways throughout the country, according to my observation—and I have had unusually good opportunities for observation—have been, with very few exceptions, honorable men, conducting an honorable business in an honorable way.

"Contrary to the general belief, the electric railway industry has not been, on the whole, a profitable one. While in the first few years of the business some large fortunes were made—and perhaps improperly made—these have been exceptions. As a fair sample of the real earnings of electric railway companies I may cite conditions in Massachusetts. In that State there has been a commission with power to supervise the issuance of securities during the entire twenty-four years of the life of the industry. Consequently there have been no stock-watering scandals, and a dollar of capitalization in any of the companies operating there unquestionably represents a dollar honestly invested. Yet approximately only one-half of the electric railway companies in Massachusetts pay dividends, and by the dividend-paying companies the average rate paid is but 6 per cent, while the average dividend including all companies there is but 5¼ per cent. There are people who say that 6 per cent is the maximum rate which ought to be permitted in the case of securities of this kind, but I have no hesitation in saying that if, after experiencing all the trials and tribulations and peculiar hazards of this business and going through the lean years of slight dividends or none at all, the best I can hope for in this business, after a quarter of a century of development, is 6 per cent, then I prefer to put my money in a savings bank and let it earn 4 per cent, without the risks and worries of public utility work.

"One of the most difficult problems that we have to meet in the operation of electric railways is the fixed unit of fare. It seems to be thought sometimes that there is no limit to the elasticity of the nickel. As communities grow electric railway lines are being constantly extended and the transfer system is being widened, so that the distance which may be traveled for a 5-cent fare becomes steadily greater. The result is that we receive, in reality, not a nickel, but 3½ to 4 cents. Yet the cost of everything which enters into the construction, equipment and operation of electric railways is advancing. Electric railway companies, like their customers, are feeling the effect of the increased cost of living. We have to pay more for labor, for coal, for steel rails, for the money we must raise in order to further develop our properties—in short, for everything we require—than was the case a decade ago. In the nine years of my connection with it the cost to our company for labor has advanced 5 cents per car hour per man, involving an

annual total of approximately half a million dollars. Electric railways are in the position, in many cases, of furnishing service for less than cost. Manifestly this state of affairs cannot continue indefinitely. The remedy may lie in the increase of fares, where an increase is equitable, as has been permitted in Massachusetts, or in the adoption of the zone system, which is in vogue abroad. In the latter event a passenger would be permitted to ride for 5 cents within the limits of a fixed zone, embracing, perhaps, the territory within a radius of 3 miles from the center of a city, and if he traveled beyond the zone limits would be charged for the additional ride in proportion to the distance traveled. This would put the sale of transportation on the same basis as the sale of other commodities and the only basis which is economically sound. In other words, the passenger would pay for what he got.

"You will hear it said that the public would be benefited by competition among public utility companies. That, in my judgment, is a fallacy. History has a habit of repeating itself, and if in a city where one company is operating an electric railway a franchise is granted to a second company, in five years there will be but one company, while the public will be paying in fares for the support of two. The electric railway is a natural monopoly, and because it is a natural monopoly it should be regulated. I believe in public service commissions, if they are composed of sober, thoughtful, courageous men who will not be influenced by the blandishments of corporations on one hand nor by the desire for popular applause on the other, and if the law creating these bodies and defining their functions is a sane one. By sane I mean a law which confers upon these commissions the power to supervise, as distinguished from the power to administer, the affairs of public utility companies. It is proper that the commissions should have the power of supervision regarding fundamental things, such as capitalization and perhaps rate-making, but when the law goes further and turns over the entire administration of the companies to commissions, you have the worst possible form of municipal ownership—municipal ownership without financial responsibility.

"In the building up of American municipalities there has been no more important factor than the electric railway. It has opened up new areas to residence and business and thus has created taxable values and added to municipal revenues. But the task yet to be performed is even greater. There are 40,000 miles of electric railways in the United States, yet we have only scratched the surface of the people's need in this regard. Only by the co-operation of the public can we place this industry on a basis which will enable us to meet every honest obligation, maintain the high standard of efficiency which the public has a right to expect and obtain the capital necessary for the further expansion and development of these enterprises. The citizens' interest in the continued prosperity of public utility companies is as great as that of the men charged with the active conduct of those companies, and between the companies and the public there should be, not hostility, but a recognition of mutual needs and a united effort to meet them. Otherwise the industry will stagnate."

REMARKS OF OSCAR T. CROSBY

Mr. Crosby said in part: "Government is the organized justice and the organized injustice of society—of the people who live under some general agreement as to the occupation of a part of the earth's surface. We want, therefore, that our criticisms should be considered as the criticisms of good and obedient citizens who, even in asserting their own rights, may be doing not only a selfish act of self-preservation but also be serving some larger purpose in standing for principles which are important to others as well as to themselves.

"A street railway company consists of a small number of men who make an agreement with all the others, represented by their government, to do certain things for those others. The very fact that the government in question, whether it is city, state or nation, has it within its power to be unjust should make it a matter of greater concern that the agreement be very explicitly drawn and should leave as little as possible of tyrannical power to be exercised in ways other than those pointed out in the contract. In other words, the agreement should be as simple as possible and as nearly automatic as possible, and it is not desirable that any citizen in his relations to his government should be largely left to be dealt with by that overworked word 'reasonable,' which is now on every lip. Men have cut each other's throats and devastated fair cities since the world began by way of expressing differences of opinion concerning what is reasonable. This is particularly true when the word is made to apply *ex post facto*. Indeed, it may be said that no rule which is unknown is reasonable.

"The contracts between the public and street railway companies, as they generally appear in the United States, are not as carefully drawn as would be desirable, looking to the interests of both parties. Looking back over the past twenty-five years, I can see that on both sides there was haste at the beginning. Old horse railway franchises were patched and mended by men inexperienced in such matters. I speak with freedom on the subject as I myself had a good deal to do with a number of such operations when all of us were forced to feel our way. Somewhat later it became my duty to go over a number of European franchises or concessions. They are wearisome in the extreme, but they are far more satisfactory from the point of view of being specific than those which generally control our American operations.

"To-day it is the fashion to set very low limits to the earning capacity permitted to such capital. There can be no doubt whatever that had there been so much as a suspicion twenty-five years ago that money thus risked would be now limited to 6 per cent no man would thus have ventured his funds. At that time every detail of the art was full of vexatious uncertainties, and nothing was more uncertain than the matter of return to the capital thus invested. But those who were engaged in the new work were young and enthusiastic. They believed, as turned out to be the case, that they were establishing a new and great art, which would benefit the whole public. They believed that it would yield large profits. Their first prediction as to the benefit to the whole public has been universally realized. Their second prediction, or hope, has been realized only in a few cases. It is just this hope, however, that keeps the world going. It is just this confident belief on the part of young men that they or their associates will make large profits that permits inventions to pass through the period of wearing and killing trial.

"We hoped at the beginning that a motorman could operate the car and fares be collected in fare boxes in the old-fashioned way then widely spread in the horse-car service. We now know that a conductor must be on every car. Both of these employees have had largely increased wages. A hundred burdens have been taken up and borne, and the business has shown, it must be recognized by all, a remarkable elasticity. It has thus far, however, called for an investment so great that only the supposition of the possibility of considerable profits could have continued the stream of gold that has gone into the ground.

"A confused conception that large profits have been made—larger than some think they should be—is now possessing the public mind. If the facts were known, the unrest in this respect might be allayed. The country is strewn with wrecks of railway enterprises. I have on a good many occasions, for myself and associates, bought street railways at foreclosure sales at the same reduced prices as those which attract one to an auction counter. Only recently, near the city of Trenton, N. J., where I now administer the principal street railways, lines aggregating 36 miles or more, built by Tom and 'Al' Johnson, so widely

known in the street railway world, were sold at a loss to the estates of those two eminent street railway men of $700,000 or $800,000 out of a total investment of approximately $1,700,000. I mention this case, not because it stands alone in regard to ratio of loss, but because the chief loser, Tom Johnson, brilliant man as he was, clever politician as he was, made just such mistakes as may befall any of us in the art in which he was the prophet of low fares.

"With respect to fares we must recognize that in some way the public prefers to control this subject. It did undertake the control when it granted franchises permitting a 5-cent fare, and by implication permitting and indeed inviting capital to an unlimited return, save as the limit would be fixed by the conditions of the business itself. If now, in the exercise of its sovereign power, the public intends to invalidate those contracts, it should first contemplate the fact that a certain injury is done to all investments based upon confidence in the contract-keeping quality of the public. If, in spite of all this, it is yet determined to make such a limitation, directly or indirectly, it must be obvious that anything like a 6 per cent rate established for money invested in the past constitutes a denial of what every common-sense man must know to have been the conditions surrounding the contract when made. No man goes into a riskful business on that rate. He should not be held down to it after he has passed through the risks and established a success. So far as money required for future development is concerned, the case will in a measure take care of itself. Any error made by the public in fixing the limit too low will retard the development of properties and in time the lesson will be duly learned.

"In the end we must all worship at the shrine of this trinity—good service, good wages, good dividends. There can be no development of one of the persons of this trinity without a corresponding development of the other. Good service is the very object of the whole effort, so far as the public is concerned. Good wages ought to be the object of desire of the heart of every employer in the land. Good dividends must be either earned or hoped for, in order to produce the inflowing streams of capital which our growing cities require for their public utilities. Those officials who believe that good service and good wages can be had without good dividends will undoubtedly be taught their error by the inexorable logic of events."

VISITS ON MAY 11

On Saturday, May 11, the party visited the new Fruitvale power station of the Southern Pacific Company at Oakland. This station was described in the Electric Railway Journal of Feb. 4, 1911. An inspection was also made of the 1200-volt road of the company operated from this power station. A. H. Babcock, electrical engineer Southern Pacific Railroad, was in charge of the party. The courtesy, hospitality and constant attention of railway officers both of San Francisco and Oakland will long be remembered by the visitors.

VISIT IN PORTLAND

The party left San Francisco on the evening of May 12 and arrived in Portland on the morning of May 14. There the visitors were met by Mayor Rushlight and representatives of the different commercial clubs and bodies in the city and by the following officers of the Portland Railway, Light & Power Company: B. S. Josselyn, president; F. W. Hild, general manager; F. D. Hunt, traffic manager; C. P. Osborne, superintendent of power; C. J. Franklin, general superintendent railway department, and W. T. Buchanan, publicity agent; also by Guy W. Talbot and A. S. Grenier, president and vice-president of the Pacific Power & Light Company, of Astoria. The morning was spent in a trip by automobiles around the city and through the adjacent country. Luncheon was served at the Rotary Club, a downtown business organization, and at the conclusion of the luncheon the principal address was delivered by Mr. Crosby. In the afternoon there was a trip on the Willamette River, and in the evening there was a banquet by the Portland Commercial Club. It was the largest event of the kind that has so far taken place on the trip. The club is the most important organization in Portland—is, indeed, the voice of Portland. Therefore what was said there by local men may be regarded as among the most significant utterances on the Pacific Coast. Over 150 representative citizens of Portland were present. There were eleven speakers, including the Mayor and Clyde Atchison, chairman of the Railroad Commission of Oregon; G. F. Johnson, president Provident Trust Company; E. B. Piper, managing editor *Oregonian* and president of the club; Vice-president Larson, of the Realty Board, and President McCarter.

Mr. Atchison, of the railroad commission, said he wished that a larger body of the citizens of the State might have been present and believed that they would have coincided in the view that the presence of the visitors and the manner in which President McCarter had discussed his subject were a public benefit which could not be overestimated. The tendency of local speakers, even those with the most radical inclination, to declare all legitimate public utility investments secure in Oregon, even more so than elsewhere, was marked. It was also generally agreed that Oregon, to develop further her remarkable prosperity, now needs for all purposes not public utilities merely, but capital from the outside.

VISIT TO VANCOUVER

The travelers left Portland early on the morning of Wednesday, May 15, and reached Vancouver on the afternoon of the same day. They were welcomed by the officials of the British Columbia Electric Railway Company, including R. H. Sperling, general manager; F. R. Glover, assistant general manager; George Kidd, comptroller; G. R. G. Conway, chief engineer; J. B. Ingersoll, electrical engineer; Charles Rummell, manager light and power department, and C. B. Vorce, construction engineer. They were escorted to the city hall, where they were welcomed by the Mayor of the city. In the evening they were entertained at dinner at the Vancouver Club and then attended a meeting at Pender Hall conducted under the auspices of the Board of Trade. There was no discussion of local matters, owing probably to a complicated situation regarding certain questions connected with franchises, which are due more to local politics than to general economic reasons. The opinion was expressed at the meeting, however, that the case of the public utility companies in Vancouver was strengthened and the public enlightened by the visit.

VISIT TO SEATTLE AND TACOMA

The party left Vancouver the same evening and reached Seattle early on the morning of May 16. Here it was entertained by the officials of the Seattle Electric Company, the Puget Sound Electric Railway Company and the Tacoma Railway & Power Company, including H. T. Edgar, manager; A. L. Kempster, superintendent of railways; Richard T. Laffin, vice-president; James B. Howe, assistant secretary; G. B. Harrington, superintendent of coal mines; Frank Dabney, comptroller; W. J. Grambs, superintendent of light and power; George P. James, chief engineer and park manager; E. C. Baumnitz, purchasing agent; George C. Carson, claim agent; G. A. Richardson, superintendent of transportation; A. D. Campbell, superintendent rolling stock and shops, all of the Seattle Electric Company; A. S. Michener, vice-president Seattle-Everett Traction Company; D. C. Barnes, manager Seattle Everett Traction Company; J. A. Shackleford, president Tacoma Railway & Power Company, and L. H. Bean, manager Tacoma Railway & Power Company. L. B. Faulkner, manager Olympia Light & Power Company, was also in attendance. The party was taken around the city and inspected the railway system of the Seattle Electric Company. Lunch followed at the Arctic Club with Mr. Edgar, general manager Seattle

Electric Company, as host. In the evening Jacob Furth, president Seattle Electric Company, gave a large dinner at the Ranier Club. It was attended by prominent officials of the Stone & Webster companies in Seattle as well as the Mayor of the city, the president of the Chamber of Commerce, the president of the Commercial Club, ex-Senator Wilson, who is proprietor of the *Post-Intelligencer,* Colonel Blethen, editor of the *Times,* H. B. Zimmerman, general manager Grays Harbor Railway & Light Company, Aberdeen, and a large number of other prominent citizens. On Friday, May 17, the party expected to visit Tacoma and May 18 Spokane.

GENERAL IMPRESSIONS OF THE TRIP

The feeling was general and always cordially expressed that wherever the party has been and has presented the case of the electric railway industries as it really is much help is given to the local companies and a new point of view is obtained by public writers, speakers, officials and civic bodies.

The party throughout its trip on the Pacific Coast is impressed more and more by the extent and quality of the progress being made there and by the manifestations on every hand of an enlightened public spirit. It is clearly evident that if this trip should be repeated next year the audiences at meetings everywhere, South, Southwest and West, would be from two to four times larger than even those which have been addressed this year.

CONTRACTS FOR ELECTRICAL EQUIPMENT BETWEEN STAMFORD & NEW HAVEN

The New York, New Haven & Hartford Railroad announced this week that it had awarded the contracts for the foundation for the concrete work for the catenary construction on the new zone between Stamford and New Haven. The order will amount to several hundred thousand dollars and was obtained by the Jobson Gifford Company, of New York.

The company also announced that it had closed a contract for twenty-four new single-phase electric locomotives for this service with the Westinghouse Electric & Manufacturing Company. The locomotives will be of the straight single-phase Colonial type with twin motors geared to a quill, of the same size and similar to the No. 69 Colonial locomotive described on page 271 of the Electric Railway Journal for Feb. 17, 1912. The only difference will be that the locomotives will not be equipped with direct-current control, as they will be used exclusively on the division between New Haven and New Rochelle and then on the Harlem River branch to 138th Street, New York. This will simplify their construction materially. The order for these locomotives amounts to over $1,000,000, and with this order the New York, New Haven & Hartford Railroad will have over 100 electric locomotives. Their receipt will allow the entire division between 138th Street, New York, and New Haven to be operated exclusively by electricity. The locomotives will be delivered as completed at the Westinghouse Works at Pittsburgh, and it is expected by the officials of the New Haven Railroad that the New Haven-Stamford electrical zone will be ready for operation soon after the first of next year.

During the past winter one of the large Eastern railways bought its sweeper broom rattan in accordance with the following specifications: "Best quality selected stock 30 in. long to be not less than ¼ in. and not more than ⅜ in. in diameter, measured at small end." The stock furnished in accordance with the foregoing specification gave the company excellent results and with very much less waste, although it was possibly a little more expensive in first cost than rattan which had been purchased by former methods of purchase.

MOVING PICTURES ON A CHARTERED CAR

BY C. A. HOUGHTON, CHIEF ENGINEER PITTSBURGH, HARMONY, BUTLER & NEW CASTLE RAILWAY COMPANY

The Pittsburgh, Harmony, Butler & New Castle Railway has recently added to its passenger equipment a new type of car for handling chartered parties over the 76 miles of right-of-way covered by its tracks. The car was constructed especially for this class of service in accordance with specifications drawn up by the president of the road, R. H. Boggs, and it embodies several unusual provisions for the comfort and entertainment of its patrons. At least one of these, the motion picture feature, is entirely original in its application and suggests a new method which can be used by an aggressive and energetic management in order to attract attention and patronage to its road.

Rear Vestibule

The exterior of the car differs but little from the company's standard passenger cars, the principal alterations being in the narrower forward doors and in the lettering, which omits the customary car number and substitutes the symbolic name of "Harmony," as shown in the accompanying exterior view of the car. The car body, which was built by the St. Louis Car Company, is 47 ft. 4 in. over all and weighs approximately 35 tons with the trucks and electrical equipment complete. The trucks are the Type C-60 made by the Standard Motor Truck Company and fitted with four GE-205 motors operated by a modified Type M control. This control is arranged for 1200 volts direct current on the company's own lines and for 500 volts direct current on the Pittsburgh Railways tracks, over which the company also operates.

In the interior design the customary smoker and the baggage compartment have both been omitted, thus eliminating all partitions and providing an observation front.

Interior View Showing Motion Picture Screen Lowered

The finish is in polished mahogany and is identical in pattern and appearance with the newer types of Pullman cars now in use on the leading steam roads. The interior electric lighting is conceded to be somewhat superior to that found on Pullman cars. Each overhead, deck and in-

dividual side light is inclosed in a Holophane hemisphere, held in a special cast bronze holder. The arrangement, which is shown in the interior views, gives a soft diffused illumination, absolutely free from shadows or dazzling high lights yet of sufficient intensity to make it easily possible to read the finest print at any point or angle in the car. The applied illumination is 4.53 cp per square foot of car floor.

The Pullman de luxe effect is still further carried out by the draped valance of golden velours plush on each side,

Harmony Route Party Car

the damask slip covers with the company's monogram on the back of each seat, folding lunch and card tables, individual push buttons, model toilets and other refinements.

The most unusual feature, and the one that is the most popular with the patrons, is, of course, the moving picture machine, the use of which is included in the charge for the car when chartered by evening parties. Considerable effort was devoted to the arrangement of this device in order to permit it to be installed without detracting in any way from the appearance or capacity of the car.

The motion pictures are projected upon a special "Mirroroid" picture screen located at the front end of the car on a roller which permits the screen to be easily rolled up or lowered into the position shown in the accompanying halftone. The machine used is a No. 5 Motiongraph located on the right-hand side of the rear platform vestibule and made fast to a specially designed focusing bed supported at the proper height on three "elevator" guides. By this "elevator" the machine can be quickly raised into the vestibule roof dome, where it is concealed by a trap door,

Interior View Showing Card Tables in Place—Motion Picture Screen Rolled Up

which, being above the required clearance for head room, presents no obstruction whatever to ingress or egress from the car.

When required for service the machine can be instantly lowered on the "elevator" guides to the stops which support it at the proper height to align the lens with a small orifice in the partition between the vestibule and passenger compartment. This orifice is at a sufficient elevation to allow the pictures to be projected over the heads of the seated passengers and onto the screen at the front end of the car. A view of the vestibule is shown with the machine and the operator's folding platform lowered into operating position.

Current for the arc is obtained from a 1/6-kw, 80-volt shunt-wound dynamotor of special design, manufactured by the Crocker Wheeler Company. This dynamotor is suspended from the underside of the vestibule platform, from which point leads are brought up to a concealed cabinet built into the vestibule partition. From this cabinet the operator controls both the dynamotor and interior lights.

Contrary to first expectations, the vibration of the car when in motion is found to have absolutely no ill effect on the successful working of the machine even when the car is operated at 45 m.p.h. or faster.

All of the various features of the car equipment were designed and applied at the company's shop at Harmony Junction by the operating staff. The generic idea and its successful application are due to the aggressive policy of H. E. Etheridge, general superintendent, in collaboration with the writer, who designed the lamps, elevator, focusing bed and dynamotor. Master Mechanic John Christianson designed and applied the car wiring, the finish and the interior fittings.

GAS-ELECTRIC MOTOR CARS FOR THE FRISCO SYSTEM

An order has just been received by the General Electric Company from the St. Louis, Brownsville & Mexican Railway, St. Louis, Mo., one of the lines of the Frisco System, for two more type GE-70-B-11 gas-electric motor cars, making a total of seventeen of these cars purchased by the Frisco lines.

The cars measure 70 ft. 5 in. wide and are divided into four compartments, one for passengers, 33 ft. long; smoking compartment, 10 ft. long; baggage compartment, 11 ft. long, and engine room, 12 ft. long. The entire seating capacity of each car provides for ninety-two passengers and the net weight of the car is approximately fifty tons. The cars will have side entrances for passengers and a rear door for use of the conductor when the car is coupled to trailers for train operation.

The motive power consists of an eight-cylinder, four-cycle gas engine of the "V" type direct-connected to a 600-volt commutating pole electric generator, designed to meet the special conditions which the service demands. The starting of the engine is effected by compressed air taken from the main reservoirs of the air-brake system, which are built with surplus capacity for this purpose. The main air compressor is driven from the crankshaft of the main engine and is fitted with an automatic governor which maintains a constant pressure.

An auxiliary equipment is also provided, consisting of a two-cylinder, four-cycle gas engine direct-connected to a single-cylinder air compressor and also to a lighting generator. The function of the set is to supply an initial charge of air for starting the main engine and to furnish current for lighting the car. This engine is started by hand.

Mounted on the axles of the forward truck are the driving motors, two GE-205, 600-volt, box frame, oil-lubricated commutating pole railway motors of 100-hp each. By means of a special controller these are placed progressively in series and parallel connection. The voltage is also varied by changing the strength of the generator field, all of which is accomplished by the movement of a single handle on the controller.

FREIGHT TRAIN TEST ON FORT DODGE, DES MOINES & SOUTHERN RAILWAY

At the meeting of the American Institute of Electrical Engineers held at Schenectady, N. Y., May 17, S. T. Dodd, of the General Electric Company, presented a paper entitled "Freight Train Tests on an Electric Interurban Railway." The tests, as hereinafter described in abstract, were conducted on the Fort Dodge, Des Moines & Southern Railway, which is described elsewhere in this issue.

TESTING OUTFIT

The test instruments were mounted in a box car and suitably wired up to flexible leads extending from one end of the car and ending in terminals by which they could be connected in the circuit of the locomotive to which the car was coupled.

The instruments comprised the following: One d.c. direct-reading 1500-volt voltmeter; one d.c. direct-reading 300-amp ammeter; one graphic recording voltmeter and one graphic recording ammeter of the same capacities as the direct-reading instruments, with time marker clock and auxiliary marker pen indicating revolutions of the car wheel, and one railway type d.c. recording watthour-meter with a capacity of 1200 volts and 600 amp.

The integrating wattmeter and the voltmeter were connected in the main trolley circuit of the locomotive to read the total voltage and watts delivered at the trolley wheel. The ammeters were connected in the circuit of one motor only, in order that the current readings might be translated directly into terms of tractive effort without reference to the controller position. If, on the other hand, the current readings had indicated the total current in the locomotive it would be necessary to observe whether the controller was on the series or parallel notches and whether the locomotive was running on a 600-volt or a 1200-volt section of the line, in order to obtain a correct expression for tractive effort. It was assumed in all the readings that the current in all motors was the same at the same instant. This is true under ordinary conditions due to the balanced combinations obtained by the bridge control. An exception will be noted when one pair of wheels slips in rounding curves or on slippery sections of track, throwing all the load on the other pairs. Some instances of this were noted during the tests, but they were exceptional.

In preparation for a test the car would be coupled to a train just back of the locomotive and the leads connected into the appropriate fuse block terminals. The duties of the five observers were approximately as follows:

One man watched the recording ammeter and a second the recording voltmeter. These observers maintained accurately the speed and excitation of the instruments and made notes upon the record sheet. A third man noted, by means of an auxiliary marker pen, the instant of passing given points such as stations and changes in grade, and also took readings of the integrating wattmeter at points where changes in grade or character of traffic made these readings advisable. A fourth man kept track of the train weight and kept a record at each station of the amount of switching and train movement. The fifth man kept the log, keeping a continuous record of the time of all events, readings, notes, etc., which were reported to him by the other observers. Five test runs were made.

TRAIN FRICTION

No tests were made with the particular end of obtaining train friction, but some readings have been selected in order to obtain a value of train friction at points where a fairly constant speed and current show that the effect of acceleration is eliminated. This value of train friction is not presented with a view of comparing in accuracy with the elaborate formulas and curves on freight car resistance which take into account the effect of speed, weather, temperature and other conditions, but it is presented as representing the average conditions during the tests and is to be accepted for comparative purposes only. It does possibly illustrate the variation in train friction and the values which may be expected in cars picked up along the interurban lines. The average train friction shown by twenty-five readings was 7 lb., the minimum 5.54 lb. and the maximum 9.6 lb. per ton.

CURVE AND GRADE RESISTANCE, ETC.

Unfortunately no uniform results could be obtained in ascertaining the value of the increased train resistance due to track curvature. The track is in general straight, with easy curves, and the increased train resistance, due to a part of the train being upon a curve, was masked by other variable conditions. An average of all the reliable results shows an average train friction of 13.4 lb. per ton and a variation of train resistance above and below the average value of 15.8 per cent. It seems to be indicated by these tests that in figuring train resistance on tracks where a combination of grades and curves is encountered it is fair to assume that the train resistance is doubled, and to allow a variation in total train resistance of approximately 15 per cent above and below the average calculated value to compensate for surging set up in the train by variations in the track.

One of the observers was intrusted with the particular duty of noting during switching movements each movement of the train and approximately the tonnage handled, estimating the tonnage from the number of cars and their condition as to load, and estimating the distance traveled from rail lengths or distances between trolley poles. In obtaining the schedule speeds all time at stations in excess of five minutes has been deducted. There were several instances during the test where the train was held waiting for connections or train orders in excess of five minutes, and in all such cases time has been noted in a column by itself as "Time Lost." The time noted in the column under "Switching" includes the time devoted to drilling cars and making up the train, while the time noted in the column under "Main Line" includes all station stops not in excess of five minutes.

ENERGY CONSUMPTION

The energy consumption given in the accompanying table includes that used for auxiliaries, lights, air-brakes, etc.

		Energy Consumption								
		Main Line.					Switching.			
Test Run.	Total Time, Minutes.	Distance, Miles.	Time.	Schedule Speed	Watt-hr. per Ton-Mile.	Time Lost, Minutes.	Distance, Miles.	Time.	Schedule Speed.	Watt-hr. per Ton-Mile.
No. 1.....	222.5	35	152	13.8	26.2	33	2.23	37.5	3.6	77.8
No. 3.....	343	43.4*	294	9.0	28.0	15	1.24	34	2.2	85.5
No. 4.....	285	34.9†	169	11.3	22.3	95		21		
Average				11.4	22.5				2.9	81.6

*Add 2.9 miles for doubling. †Add 3.85 miles for doubling.

RATIO OF REVENUE FREIGHT TO GROSS WEIGHT

The ratio of revenue freight to gross weight for runs aggregating 109 miles was approximately 50 per cent. The lowest figure was 29.2 per cent and the highest 65 per cent.

ACCELERATION

The following general conclusions were drawn from the acceleration tests:

(*a*) Allowance must be made for increase in train resistance above the normal. Apparently a resistance of 15 lb. per ton is fair for such conditions as are represented by the tests under discussion.

(*b*) The allowable rate of acceleration may be as low as 0.1 m.p.h.p.s., or 10 lb. per ton. This in combination with 15 lb. per ton for train resistance is none too low, as the train resistance falls off as soon as the train is under motion, giving a fair rate of acceleration over the range of the rheostat steps.

(*c*) The available tractive effort for acceleration is not more than 80 per cent of the maximum tractive effort at the slipping point of the drivers. This means that if the

slipping point is assumed at 30 per cent tractive coefficient, not more than 24 per cent tractive coefficient is available for acceleration.

INTERSTATE COMMERCE COMMISSION ACCIDENT REPORT

Accident Bulletin No. 2 of the Interstate Commerce Commission contains a summary of a report made by the chief inspector of safety appliances regarding an accident on the Detroit United Railway on Oct. 16, 1911. The report says:

"A rear-end collision between second and third sections of southbound local passenger train No. 59 at Volney Smith's crossing, near Detroit, Mich., occurred on Oct. 16, 1911, resulting in the death of one passenger and the injury of sixty passengers and one employee.

"This collision was caused by the failure of the motorman on the third section of train No. 59 properly to control the speed of his car where low speed was required both by a rule of the company and a fixed slow signal (slow board), located about 700 ft. north of the highway crossing near which the collision occurred.

"A contributing cause of the collision was the dangerous practice of the company in requiring crews of cars going in one direction to change off with crews of cars going in the opposite direction regardless of where such cars meet, and the custom of crews changing cars under such conditions with no rear-end protection to the standing cars, either by block signals or by flags.

"The division of the United Railway upon which this collision occurred extends from Detroit northward to Dean, Mich., a distance of about 18 miles. It is a double-track road, operated by electricity, nearly straight and practically level for the whole distance. Trains are run on a regular schedule, without block signals, under a verbal dispatching system, orders being transmitted from the train dispatcher to the conductor of the train by telephone. The conductor receiving the order writes it down and repeats it back to the dispatcher in a sufficiently loud tone to permit the motorman, who is just outside the telephone booth, to hear.

"Train No. 59 on the day of the accident was being operated in three sections. The second section of this train left Dean, southbound, for Detroit, with orders to display signals for a following section from Dean to limits, and instructions to change off with the crew in charge of one of the three sections of northbound train No. 60 wherever they might meet. On account of running into fog banks, the second section of train No. 59 did not make good time. Not knowing which section of train No. 60 was operated by the crew with which they had orders to change off (train No. 60 also being run in three sections), the motorman on second No. 59 slowed down and signaled with the headlight on meeting each of the sections of train No. 60. Finally the third section of train No. 60, operated by the crew which was to change with the crew on second No. 59, was met, and both cars came to a stop. This stop was made a short distance south of Volney Smith's crossing, 2.4 miles from Dean, at the end of a slight curve where the track changes from one side of the highway to the other. Before the crews had time to make the change, within 30 seconds after the stop was made, the third section of train No. 59, which left Dean about four minutes later than the second section, approached at a high rate of speed, and at about 7.54 p. m. crashed into the rear of second No. 59, causing the casualties above noted.

"At the point where the accident occurred there is nothing to obstruct the vision, there being a clear view for over 2 miles in either direction. It was stated by some of the employees at the investigation that on the night of the accident the weather was foggy at certain points along the track, but it was clear at the point where the collision occurred. The motorman of third No. 59 did not reduce speed on account of the fog banks and did not know that the crew of second No. 59 was to change off with a crew on one of the three sections of train No. 60. It is the practice on this road, when it is necessary to change crews, to require or permit the change to be made wherever the trains chance to meet, without flagging or giving the trains or cars any rear-end protection. The company has a rule requiring cars to slow down at all curves. There was a curve at the place of the collision which was specially located by a slow board about 700 ft. north of the highway crossing. The company also has a rule requiring local trains or sections of a local train to keep a distance of at least 3,000 ft. apart when following one another, and limited trains are required to keep 1 mile apart when following one another, except when closing up at meeting points. This rule cannot be properly observed on a railroad where there are no available means to indicate to motormen when they are closing up upon another train. It is unreasonable to suppose that a motorman can determine in dark or foggy weather the location of a car he is following definitely enough to comply with this rule.

"As this collision occurred within thirty seconds after the second section of train No. 59 had come to a stop, the conductor of the standing train would not have had time to flag the third section immediately behind him, even if it had been the custom to do so when changing crews.

"The employees involved in this accident were experienced men with good records, and were not working contrary to any of the provisions of the hours-of-service law."

BIDS INVITED FOR ELECTRIFICATION OF MELBOURNE SUBURBAN RAILWAYS

Advertisements have recently been published in London to the effect that the agent-general for Victoria, Australia, is prepared to receive tenders for certain equipment in connection with the electrification of the Melbourne Suburban Railways. The work is divided into three sections as follows: Boilers, boiler house equipment and condensing plant common to either an a.c. or d.c. system; direct-current traction system consisting of turbo-alternators and transformers, substation equipment and electrical equipment of cars; single-phase system, consisting of turbo-alternators and transformers, substation equipment and electrical equipment of cars. The consulting engineers are Merz & McLellan, London, Eng., by whom bids must be received not later than Tuesday, June 4, 1912. It is understood that the generating station is to have an output of 60,000 kw with units of either 10,000 kw or 20,000 kw each, and that the aggregate length of the system is to be about 300 miles measured as single track.

THE LJUNGSTRÖM STEAM TURBINE

The Ljungström turbine is the latest development in the field of steam turbines of the reaction type. As described in *Engineering* of London it consists essentially of a radial flow machine. The steam is admitted between two disks, and in its passage from the center to the circumference it passes between concentric blading rings carried alternately by the two disks. In the usual design both disks revolve, driving their shafts at equal speeds. To each shaft is coupled an electric generator. Since the relative speed of the blade is twice as great as in the standard reaction turbine of equal diameter and peripheral speed, equal efficiency may be obtained with only one-quarter as many rows of blades. Since there is no long casing with fixed blading, the risk of distortion trouble is largely eliminated. This also permits an almost unlimited degree of superheat, which, together with the reduction of gland and other losses, tends to give the machine a high efficiency.

ORGANIZATION MEETING OF THE KEYSTONE RAILWAY CLUB

In response to a call sent out by J. L. Gould, master mechanic United Traction Company, Reading, Pa., and J. G. Baukat, superintendent of equipment Lehigh Valley Transit Company, Allentown, Pa., twenty-six railway men and thirty representatives of manufacturers assembled on Tuesday, May 14, at the Hotel Allen, Allentown, Pa., to organize a club for the discussion of problems relating to electric railway operation and maintenance. The meeting was opened with an address by Mr. Gould, who said that the scope of the club would not be confined purely to the discussion of mechanical problems, especially in view of the fact that on the smaller properties the same man was in charge of several mechanical and operating departments. The representatives of the manufacturers would be very acceptable as members, as through them the railway companies became quickly acquainted with the latest developments in electric railway equipment. He suggested that the membership should consist of individuals instead of companies, but that honorary membership should be created for presidents, general managers and other executive officers of railway companies so that the latter would have the opportunity of participating in all discussions, although not

Charter Members of the Keystone Railway Club

of voting for officers. He suggested that the officers of the club should consist of a president, a vice-president, a secretary and a treasurer, and he proposed the appointment of a committee to formulate a constitution and by-laws. In conclusion, Mr. Gould made a strong appeal for the co-operation of the smaller companies, which were those that would obtain the greatest benefit from the discussion of mechanical and operating problems.

The election of officers resulted as follows: President, J. L. Gould, master mechanic United Traction Company, Reading, Pa.; secretary, J. G. Baukat, superintendent of equipment Lehigh Valley Transit Company, Allentown, Pa.; treasurer, W. O. Stieff, Galena Signal Oil Company, Reading.

There was a general discussion as to the best method of defraying the expenses of the club. E. C. Spring, assistant to president Philadelphia & Western Railway, suggested that greater stability of organization would be obtained by incorporating the club and having specific dues. Any surplus at the end of the year could be used for the reduction of charges during the ensuing year if so desired. The expenses of the first meeting were paid by the members on a pro rata basis, but in the future a dues system will be used.

The following committee was appointed to draft a constitution and by-laws for submission at the next meeting: Messrs. Gould, Wheaton, Spring, S. A. Bullock, Baldwin Locomotive Works, Philadelphia, and F. G. Connely, Conestoga Traction Company, Lancaster.

Although the title of the new organization is "Keystone Railway Club," it was decided to seek the membership of companies operating in Delaware and New Jersey, owing to their proximity to eastern Pennsylvania. There was a general feeling that the interests of the companies in the extreme western part of Pennsylvania were already properly served by membership in the Central Electric Railway Association.

The secretary was therefore instructed to communicate with the Delaware and New Jersey companies. He was also instructed to send full particulars of the first meeting to the executive heads of all companies whose membership was desired, pointing out to them the desirability of having their department heads attend meetings of the club.

Mr. Baukat described the inception of the club. He said that it began with three men who visited one another to compare operating costs. Very soon there were as many as twelve men at these informal meetings. This condition made it evident that there was an opportunity for an organization which would take up problems, particularly those of local interest. The first idea was to confine the membership to car maintenance men, but it was soon found advisable to embrace all mechanical and electrical departments and even the transportation department.

Upon invitation R. P. Stevens, president Lehigh Valley Transit Company, then addressed the meeting. Mr. Stevens described the difficulty of maintaining an association which could cover the entire State of Pennsylvania effectively, owing to the absence of accessible central cities. This geographical condition made it impossible to have a purely state organization with such policies as that of New York. He thought that more would be accomplished by a close-knit organization made up of companies in eastern Pennsylvania and of adjacent states. He was heartily in favor of the objects of the club and he believed that it would be very beneficial to the member companies.

It was decided to hold the first regular business meeting on Tuesday, June 25, at Harrisburg, Pa., in order to attract a larger attendance from that part of the State as well as from New Jersey and Delaware. Thereafter meetings will be held in different towns at intervals of three months.

The following gentlemen were selected as an entertainment committee for the next meeting: F. G. Connelly, Conestoga Traction Company; E. L. Green, master mechanic York Railways; D. B. Fretz, superintendent Chambersburg & Gettysburg Electric Railway; LeRoy D. Stokes, master

mechanic Hanover & McSherrystown Street Railway, and A. F. Rexroth, master mechanic Central Pennsylvania Traction Company.

Upon motion the officers were instructed to arrange a program of papers and subjects for discussion at the next meeting and to announce the titles of the same in the call for the Harrisburg meeting. The secretary announced that requests for information concerning the solution of problems would be sent to all members for study without mentioning the source of the inquiry. A. Stucki, Stucki Bearing Company, Pittsburgh, suggested the addition of a question box.

After luncheon the members were taken to the power house, shops and park of the Lehigh Valley Transit Company in the special car provided by R. P. Stevens, president. During the afternoon trip the accompanying group photograph which was taken in front of the railway company's office.

NEW EQUIPMENT FOR BOSTON

In carrying out its extensive plans for improvements and extensions, the Boston Elevated Railway has recently placed orders for a large amount of electrical car equipment. Some three years ago the company purchased 500 GE-86 motors to replace motors of the WP, SRG and other old patterns, and in continuance of this policy 500 additional motors of the same type have just been ordered. The company has also recently ordered 200 sets of K-28 controllers. Besides this it has ordered seventy-five new four-motor car equipments, each including four GE-227 motors and Sprague General Electric type M control.

The GE-227 motor is of the commutating-pole type, rated at 50 hp on 500 volts or 50 hp on 600 volts, and embodies many special features required by the conditions found in Boston. It is of the semi-box type, split below the center line, and so constructed as to preserve the advantages and rigidity of the box-frame type and at the same time afford easy access for inspection or repairs without removing the motors from the car. This motor also embodies the ventilation and light weight features characterizing the latest types of General Electric railway motors. The Sprague General Electric type M control to be used with these motors in especially light and simple. It includes eight electrically operated contactors and a reverser mounted in a single box. This apparatus is all wired as a complete unit, and it is only necessary when installing it to make the necessary connections from the motor leads, rheostats and trolley to the proper terminals.

In addition to the above rolling stock equipment, the Boston Elevated Company has placed an order with the General Electric Company for an additional 15,000-kw Curtis turbo-generator for the South Boston power station. This machine will be a duplicate of the two similar units which are now being installed, and it will generate current at 6600 volts. This current will then be stepped up by means of compensators to 13,200 volts.

The South Construction Company, which is controlled by the Louisville & Northern Railway & Lighting Company, New Albany, Ind., is improving its quarry near Sellersburg, Ind. A No. 4 gyratory crusher of the Austin Manufacturing Company, Chicago, Ill., is being installed. It will be arranged so that crushed rock may be run from the crusher into the cars without handling a second time. The quarry was formerly under lease, but was recently purchased outright. In addition to supplying material for the lines of the Louisville & Northern Railway & Lighting Company the company sells about 40,000 cu. yd. of material a season. The new crusher will be motor-driven and current will be secured from the Louisville & Northern Railway & Lighting Company.

COMMUNICATIONS

CONTRACTS FOR POWER

New York, May 10, 1912.

To the Editors:

I have been reading in your issue of April 20 the abstract of the contract for power between the Cleveland Electric Illuminating Company and the Cleveland Railway. The demand and unit charges seem confusing, as well as the use of the rates in the load-factor column. Take for an example a case of three stations furnishing power to a consumer with average demand over the selected hour on three consecutive days of 500 kw, 2000 kw and 11,500 kw respectively, or 14,000 kw aggregate demand. What is the rate per kilowatt-hour at 85 per cent power factor, when 6,300,000 kw-hr. are used per month? Subscriber.

The conditions cited above are unusual. A consumer who could utilize 6,300,000 kw-hr. per month would be unwise to contract with a separate station under an agreement similar to that at Cleveland for so small amount of power as 500 kw. There is a marked difference between the rate based on a single aggregate demand of 14,000 kw and the average rate resulting from three separate contracts covering a total aggregate demand of 14,000 kw. This is caused by the high prices charged for the first portions of the monthly consumption under each separate contract. Under a single contract these high prices are paid only once each month, but under three separate contracts they would be paid three times.

To show this difference, the rates requested in the letter are worked out below in both ways, assuming first that power is supplied under a single contract and second that it is supplied under three separate contracts, covering aggregate demands as given by our correspondent together with monthly current consumptions proportional to the demands. It will be noticed by reference to the text of the Cleveland contract that the consumer must guarantee a minimum power factor of 90 per cent, but that there is no penalty specified for a lower power factor aside from the proportional increase in demand charge. Strictly speaking, this clause would prevent the application of the Cleveland contract to our correspondent's conditions, but in order to work out the rates it will be assumed that the power company or companies would waive the guaranteed minimum of 90 per cent. The corrected demand would then become:

$$14{,}000 \times \frac{90 \text{ per cent}}{85 \text{ per cent}} = 14{,}824 \text{ kw.}$$

The first case, where there is a single contract, gives a demand charge per month as follows:

First 500 kw, at $1.475	$737.50
Next 500 kw, at $1.45	725.00
Excess above 1000 kw, or 13,824 kw, at $1.00	$13,824.00
Total	$15,286.50

The monthly power consumption of 6,300,000 kw-hr. divided by 720 times the corrected aggregate demand of 14,824 kw establishes the load factor. This means that the load factor is equal to the mean hourly consumption divided by the maximum hourly consumption, the figure 720 being the number of hours in a month arbitrarily assumed in the contract,

$$\frac{6{,}300{,}000}{720 \times 14{,}824} = 59^{\circ} \text{ per cent,}$$

and this, being well above the guaranteed minimum of 35 per cent, does not involve any additional charges.

The unit charge for a consumption of 6,300,000 kw-hr. works out as follows:

First 50,000 kw-hr., at 0.95 cent	$475.00
Next 50,000 kw-hr., at 0.90 cent	450.00
Next 400,000 kw-hr., at 0.45 cent	1,800.00
Next 1,800,000 kw-hr., at 0.40 cent	7,200.00
Excess above 2,300,000, or 4,000,000 kw-hr., at 0.38 cent	15,200.00
Total monthly unit charge	$25,125.00

The total cost to the consumer for the month is obtained by adding the actual demand charge to the unit charge as follows:

Demand charge	$15,286.50
Unit charge	25,125.00
Total cost to consumer for the month	$40,411.50

The total cost for the month, or $40,411.50, divided by the monthly power consumption of 6,300,000 kw-hr. gives the rate for the month, or 0.641 cent per kw-hr.

If the same total amount of power is furnished from three separate stations under separate contracts and in amounts proportioned to the given demand charges of 500 kw, 2000 kw and 11,500 kw respectively, the total charge works out as follows:

At the first station the aggregate demand corrected for 85 per cent power factor is:

$$500 \times \frac{90 \text{ per cent}}{85 \text{ per cent}} = 530 \text{ kw.}$$

and the demand charge is:

First 500 kw, at $1.475	$737.50
Remaining 30 kw, at $1.45	43.50
Total	$781.00

The unit charge for the first station is based on 225,000 kw-hr. This is 3.57 per cent of the total monthly power consumption, the demand for the first station, or 500 kw, being 3.57 per cent of the total demand of 14,000 kw, and the unit charge is:

First 50,000 kw-hr., at 0.95 cent	$475.00
Next 50,000 kw-hr., at 0.90 cent	450.00
Remaining 125,000 kw-hr., at 0.45 cent	562.50
Total	$1,487.50
Demand charge	$781.00
Unit charge	1,487.50
Total monthly charge for first station	$2,268.50

The total cost for the month, or $2268.50, divided by the monthly consumption of 225,000 kw-hr., gives the rate for the month of 1.01 cents per kw-hr.

At the second station the aggregate demand corrected for power factor is:

$$2000 \times \frac{90 \text{ per cent}}{85 \text{ per cent}} = 2117.5 \text{ kw.}$$

and the demand charge is:

First 500 kw, at $1.475	$737.50
Next 500 kw, at $1.45	725.00
Remaining 1117.5 kw, at $1.00	1,117.50
Total	$2,580.00

The unit charge for the second station based on 900,000 kw-hr. is:

First 50,000 kw-hr., at 0.95 cent	$475.00
Next 50,000 kw-hr., at 0.90 cent	450.00
Next 400,000 kw-hr., at 0.45 cent	1,800.00
Remaining 400,000 kw-hr., at 0.40 cent	1,600.00
Total	$4,325.00
Demand charge	$2,580.00
Unit charge	4,325.00
Total monthly charge for second station	$6,905.00

Rate for month = $6,905 ÷ 900,000 kw-hr. = 0.767 cent per kw-hr.

At the third station the aggregate demand corrected for power factor is:

$$11,500 \times \frac{90 \text{ per cent}}{85 \text{ per cent}} = 12,176.5 \text{ kw.}$$

and the demand charge is:

First 500 kw, at $1.475	$737.50
Next 500 kw, at $1.45	725.00
Remaining 11,176 kw, at $1.00	11,176.50
Total	$12,639.00

The unit charge for the third station based on 5,175,000 kw-hr. is:

First 50,000 kw-hr., at 0.95 cent	$475.00
Next 50,000 kw-hr., at 0.90 cent	450.00
Next 400,000 kw-hr., at 0.40 cent	1,800.00
Next 1,800,000 kw-hr., at 0.40 cent	7,200.00
Excess above 2,300,000, or 2,875,000 kw-hr., at 0.38 cent	10,925.00
Total	$20,850.00
Demand charge	$12,639.00
Unit charge	20,850.00
Total monthly charge for third station	$33,489.00

Rate for month = $33,489.00 ÷ 5,175,000 kw-hr. = 0.647 cent per kw-hr.

The total monthly cost for the three stations then is $2268.50, $6905.00 and $33,489.00, or a total of $42,662.50.

The average rate for all three stations is $42,662.50 ÷ 6,300,000 = 0.677 cent. This is nearly 6 per cent more than the rate which obtains in the case of the supply from the single station. The actual monthly cost of the power when purchased from the three stations is $2,251 more than the cost of the same power furnished under a single contract, an amount which is practically the same as that paid out to the smallest of the three stations. In other words, by putting the entire load into the hands of a single contractor the power otherwise furnished by the smallest station can be obtained for nothing.

BUILDING FOR THE FUTURE

Madison, Wis., May 11, 1912.

To the Editors:

In your issue of April 27, 1912, an editorial entitled "Building for the Future" states: "It is seldom that the advantage gained by the purchase of material or labor at any particular time will vary more than 20 per cent from the mean, but, assuming such a saving of 20 per cent in the case mentioned, the final result would be a net loss of 10 per cent on the cost of that part of the building which was in excess of the actual requirements."

It seems that in building the increase in cost due to piecemeal construction should be taken into consideration. Expenses of making contracts and drawing up plans and specifications would hardly be more if a building is built say one-fifth larger than actually required, but if the additional one-fifth is built separately, this cost would be proportionately large. Expense of duplication in piecemeal construction such as two walls, one inside at the end of an old building and another at the end of a new addition, must certainly be considered. Also, the hinging together of an old and new roof, or the building of additional stories on an old building, is costly and inconvenient.

Furthermore, there are certain advantages in future construction. Space reserved for future use, if unoccupied by machinery or workbenches, is always useful for storage purposes, and when the demand for product exceeds the company's supply the new productive machinery and workbenches can be installed more expeditiously than when it is necessary to wait until a new addition or story is completed, which often results in a hardship to the consumer and financial loss to the company due to delay in supplying the demand.

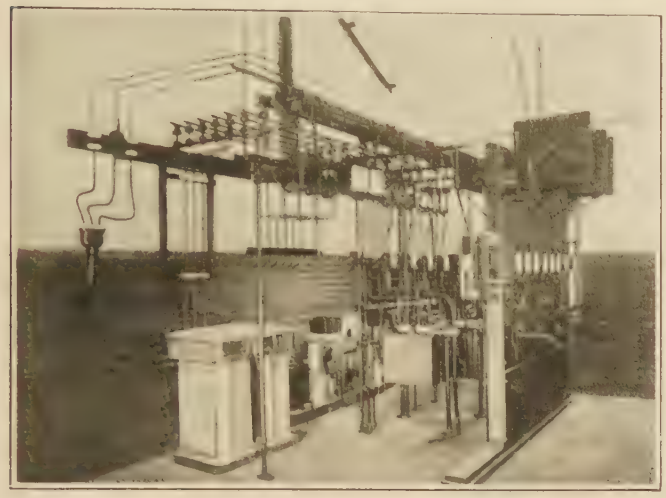
From the facts cited it is apparent that in a growing business it would seem wise and profitable to be reasonably liberal with floor space in new construction. There is no doubt that a considerable part of the 10 per cent net loss as given in the editorial would disappear in many cases.

George Eberle.

In a bulletin of the Bureau of Standards of the Department of Commerce and Labor the conclusion, reached from a number of tests, is that the addition of waterproofing compounds to concrete aggregates is unnecessary. It is stated that Portland cement mortar and concrete can be made practically watertight up to a hydrostatic head of 40 ft. by careful selection of the materials used for the aggregate, and by preparing them in such a manner as to obtain a dense mixture. The mixture should be made wet enough to puddle and, when placed, should be well spaded against the forms. The addition of "integral" waterproof compound will not compensate for lean mixtures nor for poor materials nor for improper mixing.

SUBSTATIONS OF THE PIEDMONT TRACTION COMPANY

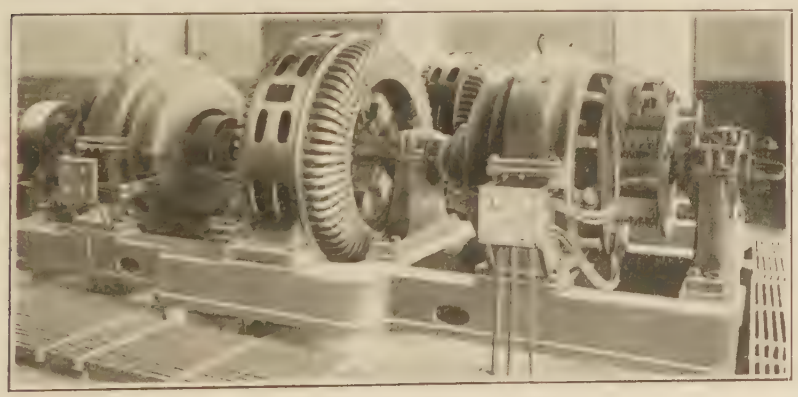
The equipment that was recently placed in service by the Piedmont Traction Company, which has commenced the operation of an extensive electric railway system in North and South Carolina, is of particular interest because the voltage of 1500 is the highest direct-current pressure ever used in this country for electric traction. The property is also of interest because the energy is not generated by the Piedmont Traction Company, but is supplied from the Southern Power Company's lines through nine substations to be located respectively at Charlotte, Gastonia, King's Mountain, Spartanburg, Greers, Greenville, Belton, Anderson and Greenwood.



View of a 1500-Volt Switchboard

Exterior View of a Typical Substation

In so far as possible duplicate equipment is used in all of the stations. The 1500-volt direct current is obtained by connecting two 750-volt direct-current generators in series. All of the equipment is Westinghouse. The motor-generator sets are exact duplicates, and each consists of two 250-kw, 750-volt direct-current compound-wound generators, driven by a 750-hp, three-phase, 60-cycle, 2400-volt synchronous motor. A 6½-kw, 125-volt direct-current exciter for the synchronous motor is mounted at the end of the shaft. Two 500-kw direct-current units have been installed in the Charlotte substation, one at Gastonia, two at Dead Falls, two at Greenville, two at Belton, a special one at Anderson and one at Spartanburg.



Side View of a 1500-Volt Motor-Generator

The energy is taken at the Dead Falls station from a 13,000-volt line and at Belton from a 44,000-volt line which is fed through step-up transformers from a 2200-volt line at the Greenville substation. In all of the other substations energy is taken directly from the 2200-volt lines, and in every case the voltage on the motors is 2200.

In all of the substations the switchboard equipment is similar. A view of the switchboard in one of the substations, but typical of that in all, is published on this page. The panels are of black marine-finished marble.

All of the circuit breakers and knife switches on the 1500-volt circuits are arranged for remote hand control. In some of the stations a TA voltage regulator has been installed for maintaining the alternating-current voltage approximately constant. It does this by acting on the exciter fields and varying the field excitation of the synchronous motor. Feeders to the trolley circuits are protected by electrolytic lightning arresters.

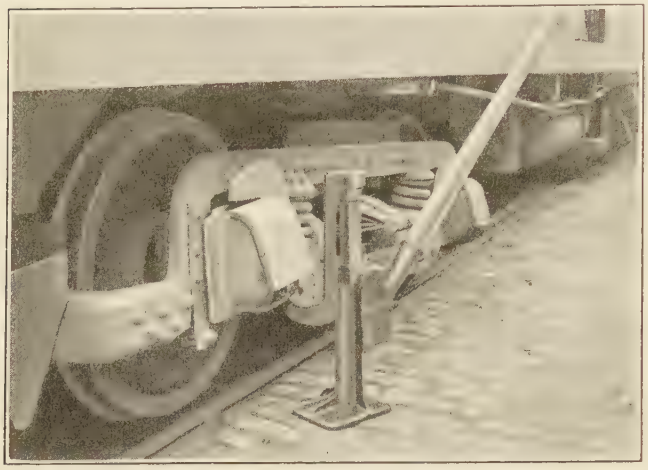
The auto starter, which reduces the voltage for starting the synchronous motor, is shown back of the switchboard in the view of the board, which also illustrates the methods of supporting the direct-current and alternating-current busbars. The voltage regulator is shown mounted at the left end of the board.

NEW METHOD OF MEASURING STEAM CONSUMPTION

The Wheeler Condenser & Engineering Company has brought out a hot well which can be attached directly to a condenser shell in which the water of condensation may be measured as it passes through the hot-well condenser to the hot-well pump suction. The hot well is divided into two chambers connected by an orifice through which all of the condensed steam must pass. A gage glass in the chamber into which the water passes from the condenser indicates its head in the first chamber, and as the area of the orifice is known this water gage is arranged so that it will read the pounds of steam consumption per hour. The statement is made that the accuracy of the gage within the whole range of readings is 2 per cent, and from readings between 75 per cent and 125 per cent load the accuracy is within 1 per cent. The meter is adapted particularly for use with steam turbines and furnishes a convenient means for approximately determining the amount of power furnished by the turbine in case it is not electrically connected to the load, but drives it instead either directly or else through gears or belts. Under such circumstances there has been no ready method of determining the load comparable to the indicator card which can be so easily taken on reciprocating engines, but the addition of this measuring hot well overcomes this difficulty as the steam consumption per hp varies little with the life of a turbine.

A NEW EMERGENCY CAR JACK

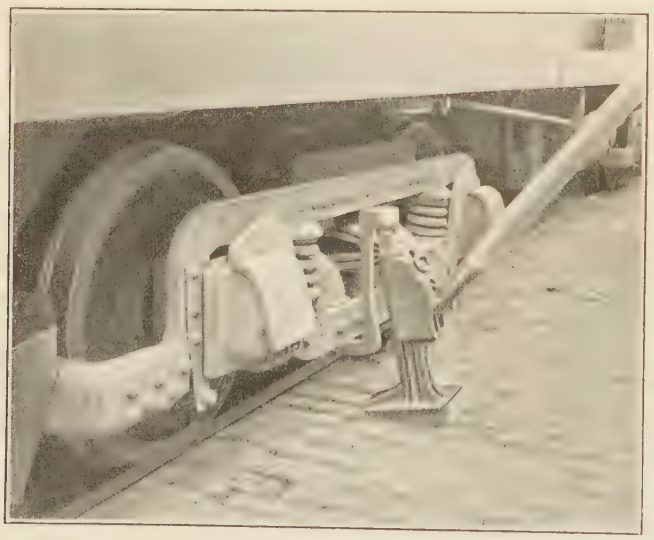
The Duff Manufacturing Company has just brought out a new "Barrett" car jack of the ratchet type equipped with a novel form of claw. The jack is especially designed to meet the modern requirements of a quick-acting emergency car jack which, on account of the claw, can be used for lifting weights having only a small clearance above the



Emergency Car Jack

ground. The claw is made of drop-forged steel and is fastened to the top of the rack by means of a ball and socket joint. In assembling the jack during manufacture the claw is placed over the ball-shaped head on the rack, and two extended wings on each side of the socket are bent in to grip the ball so that there is no possibility for the claw to be dropped off and mislaid, nor is there any necessity for care to keep it in place when the jack is in use.

The ball and socket feature of the claw permits the jack to be used for shifting loads in a horizontal direction as, for instance, when it is desirable to raise a derailed car and at the same time shift it sideways so as to track the wheels.



Jack Set at Angle to Shift Load

Under such circumstances, the jack is set at any desired angle, up to 15 deg. from the vertical, by resting the base upon a wooden wedge as shown in the accompanying halftone. When the load is lifted clear of the ground, the claw swings out from the body of the jack like a pendulum and carries the load horizontally with it. The advantage of this method of shifting loads will be appreciated by anyone who has had to use the cumbersome and laborious method of tilting the ordinary straight jack and trusting that the support at the extreme outer edge of the base will shift the load.

The ball and socket at the top of the rack permits the claw to be swung away from the frame to a vertical angle of 40 deg., but the makers do not guarantee the jack to withstand its full capacity of 15 tons when the claw is at a greater angle than 15 deg. If desired, the claw can be revolved in a horizontal plane to a position approximately parallel to the operating lever. When this is done the jack can be used for ordinary lifting, as the top portion of the claw which forms the socket and fits over the ball head of the rack is corrugated and capable of withstanding a pressure equal to the jack's capacity. The foot of the claw in its lowest position is 3 in. above the ground and the jack has a rise of 10½ in., the closed height of the rack being 22 in. The rack rises ½ in. to each stroke of the operating lever and on account of the high capacity the operation is single acting. The reversing lever is located alongside of the operating handle and faces the operator so that the direction of motion may be readily changed. The total weight of the jack is 87 lb. including the claw.

LOUISVILLE RAILWAY SLOTTING MACHINE

The mechanical department of the Louisville Railway Company has designed and built an inexpensive yet efficient commutator slotting machine in its shops at Louisville, Ky. It is mounted on one of the building columns and is belt-driven from a line shaft which passes through the armature shop. It consists of a guide casting bolted to the building column at the top of which a handwheel has been applied to a screw which raises or lowers the bracket supporting the slotting saw to the proper working elevation. The slotting saw is mounted on a cast-iron bracket which is provided with a rack and pinion. By applying a crank to the pinion shaft the slotting saw is forced horizontally to the cutting position. A circular leather belt, which is kept taut by a pivoted trolley wheel idler, drives the slotting

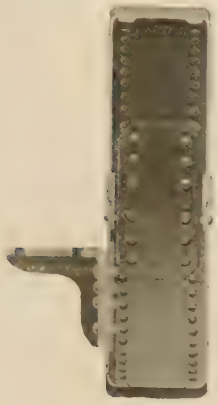
Commutator Slotter Used in Louisville

saw and the whole is controlled by a foot lever friction clutch mounted on the line shaft.

The armature support is constructed of structural steel with cast-iron armature shaft bearings. The support is mounted on wheels so that the armature may be raised to the support by the overhead traveling hoist and moved easily to the slotting machine. The whole outfit did not cost to exceed $20 and a Westinghouse-69 armature has been slotted in twelve minutes.

A NEW SHEET-STEEL GEAR CASE

The Electric Service Supplies Company has brought out a new type of sheet-metal gear case, called the "Keystone," in which a novel method of reinforcing the riveted joints by electric welding is assserted to overcome the objections to the use of sheet steel heretofore existing. In making the joints between the sides and the periphery strip the latter is first doubled over at both edges and rivet holes are punched through the two thicknesses of metal. The periphery strip is then riveted to the two sides of the case with rivets spaced at intervals of about 3 in., so that there is no danger of injury to the metal and the formation of cracks and fractures.



Cross-Section

Between each pair of rivets there is an electrical spot-weld through the three thicknesses of metal. This supplements the ability of the rivets to make the case permanently tight, as the spot-welding prevents the sheets from slipping slightly one upon the other, causing the rivet holes to enlarge and allowing the rivets to work loose.

The gear case is made from a soft open-hearth sheet steel. Each side of the case, both top and bottom halves in one piece, is formed in a press with a flange 1½ in. all around the periphery. This piece is then cut in two in such a manner that the sides will overlap when these pieces are placed in position to form the top and bottom halves of the case. All gear cases of a given type are formed by the same dies, so that halves of the same type of case are interchangeable.

At the joint between the upper and lower halves of the case and riveted to the lower half there has been placed a 2-in. x ⅛-in. iron strip for the purpose of strengthening the case for keeping water and dirt out and for keeping in the lubricant.

In connection with the gear case the manufacturers have developed a line of supporting arms designed to carry end-suspended cases on motors which were primarily designed for side suspension only. This supporting arm is a steel casting so made that it bolts to the supports on the motor frame originally intended for the gear-case brackets. Two arms extend along the motor frame behind the gear, and to these two arms the brackets of the end-suspended

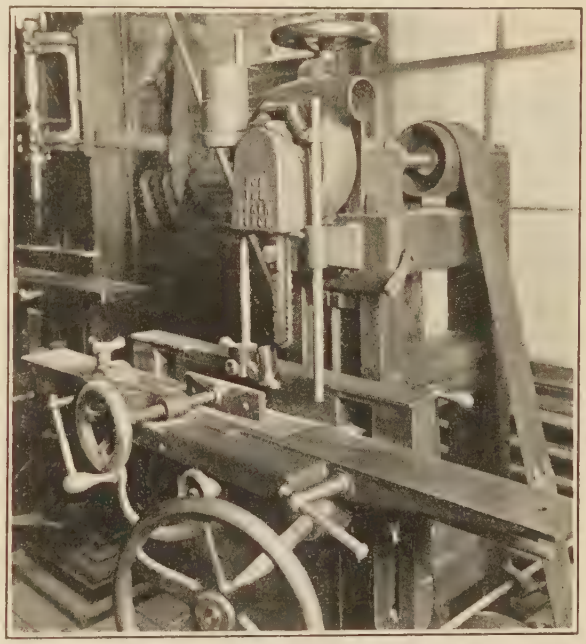
Keystone Gear Case with Side Cut Away to Show Interior

case are attached. This, it is believed, is a very simple solution of the troubles occurring with side-suspended cases. These supporting arms are made for practically all motors which use side suspension.

The gear case is manufactured with standard dies for practically all types of motors and if desired can be furnished with lugs for side suspension. However, in connection with the supporting arm described above the standard end suspended case can be used.

A CHAIN TYPE MORTISER

One of the most important tools in the Sixty-fifth Street shops of the Third Avenue Railway, New York, is a chain saw mortiser which was used in the construction of thirty-two storage battery cars in addition to the company's usual maintenance work. The machine was furnished by the New Britain Machine Company, New Britain, Conn. This tool is remarkable for its rapid and quiet mortising of all classes of hard and soft woods. It is stated that stock even as thin as ⅜ in. can be mortised successfully any way of the grain. With this machine no boring, core cleaning, splitting or reversing on usual depths of mortises is required. A blind mortise is made at a single cut and all the chips are taken away. A taper mortise is made at a single cut by the use of a taper chain bar. The tilting table permits angle mortises up to 45 deg. if necessary. The action of the chain cutter leaves the surface of the mortise perfect in every respect for gluing. There are also no irregular mortises to be filled up with wedges. As all mortises are tenoned accurately the stock put up cannot sag. A special feature of the No. 7 type used by the Third



Chain Type Mortiser Used by the Third Avenue Railway, New York

Avenue Railway is the compound table for making adjacent cuts or long mortises without unclamping the material.

The adjustments of this machine are as follows: vertical adjustment back rest, 13 in.; rise and fall of table, 7 in.; vertical adjustment of table, 20 in.; facing adjustment, 2 in. (that is, will mortise to the center of a 4-in. piece); longitudinal feed motion of table without clamping, 10 in.; shortest mortise, 1½ in.; longest mortise at one cut, 2¾ in.; deepest mortise at one cut, 6 in.; deepest mortise by reversing, 12 in.; chain saw sizes, ¼ in. to ⅝ in. inclusive. The mortiser is 5 ft. 6 in. high, requires 3 ft. x 4 ft. floor space, including pulleys, and weighs 1350 lb.

For the electrical operation of large valves in steam or water pipe lines, the squirrel-cage induction motor is recommended on account of its simplicity by H. M. Gassman in a paper before the A. I. E. E. Such a motor should have a high-resistance secondary in order to produce high starting torque and should be equipped with an automatic operating device which would prevent starting in the wrong direction with the consequent risk of damage to the valve operating mechanism.

News of Electric Railways

Improvements in Philadelphia

The Philadelphia (Pa.) Rapid Transit Company proposes to begin work soon upon its recently acquired property, approximating three acres, between Lycoming Street and Erie Avenue, York Road and Tenth Street, for the construction of a new carhouse terminal and a building to be used for general shop purposes. The structures will cost $500,000, which, with the cost of the property purchased three weeks ago, will represent an outlay of $1,000,000. The new carhouse alone will cover a space of fifteen acres, and will have storage facilities for 500 near-side cars.

T. E. Mitten, chairman of the executive committee of the Philadelphia Rapid Transit Company, has answered the Mayor's communication requesting that near-side cars be placed on Ridge Avenue. According to Mr. Mitten there is a space of only 4 ft. between the tracks on Ridge Avenue, and because of this it is impossible to put cars of the larger type on that section of the system. It is a rule of the Bureau of Surveys that on streets 34 ft. wide the distance between the tracks shall be not more than 4 ft. In his communication to the Mayor, Mr. Mitten requests that the rules be amended so as to permit tracks being replaced on the avenue to accommodate the larger cars. To tear up one track on Ridge Avenue would cost $27,000.

Since Oct. 15, 1911, 170 cars of the near-side type have been placed in operation on four routes of the system. As soon as sufficient additional new cars of the same type are received they will be placed on route No. 6, Tenth and Eleventh Streets; route No. 7, Norris Street and Susquehanna Avenue, and route No. 8. Seventh, Ninth and McKean Streets. Operation of the near-side cars on Tenth and Eleventh Streets will begin next Sunday. Of the 500 near-side cars contracted for on Dec. 6, 1911, to be delivered at the rate of 100 a month, starting April 1, 1912, 120 are now in service. All of the other 380 cars are to be delivered before Sept. 1, 1912.

It has been decided to exercise the company's option for 300 additional near-side cars to be delivered at the rate of 100 a month during September, October and November. With the delivery of these cars there will be in operation next December about 850 near-side cars.

The ordinance to appropriate $50,000 to employ experts to study transit possibilities in Philadelphia has been amended in Council so as to make it prohibitive to employ other than citizens of Philadelphia in the investigation.

Additional Stepless Cars for New York

Theodore P. Shonts, president of the New York (N. Y.) Railways, made the following announcement on May 15, 1912, in regard to the plan of the company to purchase 150 stepless cars following the very successful results which have attended the operation of the experimental cars of this type described previously in the Electric Railway Journal:

"Upon taking charge of the New York Railways we endeavored to anticipate the wants of our patrons and several weeks ago introduced into the Broadway service a new type of car called the 'stepless car.' It was claimed for this car that it would:

"1. Eliminate danger to passengers in getting on and off cars.

"2. Reduce greatly the discomfort and inconvenience of entering and leaving cars.

"3. Increase the comfort of passengers by improved seating and aisle arrangements.

"4. Facilitate car movement by reducing the length of car stops.

"5. Improve the working conditions of motormen and conductors.

"6. Make the car sanitary.

"The public was invited to offer any criticism that it saw fit to make.

"The results obtained from the operation of this car have exceeded all expectations, and in view of the favorable attitude of the public to this new type of car a study was at once made to see if some of the old-fashioned short box cars could not be displaced to advantage with the newer and larger cars. This has resulted in the board of directors, at its meeting this morning, authorizing the officers of this company to proceed at once with the purchase of 150 new cars of the stepless type. It is hoped that these new cars will be ready for service by the middle of next fall."

Peoria Railway Construction Schedule for 1912

The Peoria (Ill.) Railway will spend about $210,000 in improvements in 1912. The work which is to be done will include the following: The reconstruction of 6000 ft. of double track in Averyville, using 73-lb. T-rail with Continuous joints; the reconstruction of 5700 ft. of double track on Knoxville Avenue, using 97-lb. grooved rail in brick pavement; the reconstruction of 1300 ft. of double track on Adams Street, using 105-lb. Trilby rail in wood block pavement (this piece of reconstruction also includes two double-track turnouts); the reconstruction of 1880 ft. of single track on Main Street, using 97-lb. grooved rail in pavement, and a 5000-ft. single-track extension, including 73-lb. T-rail, Continuous joints, and 2000 ft. of double pole line overhead.

This company will also rebuild nine double-truck cars for pay-as-you-enter operation. Four new single-truck cars of the pay-as-you-enter type, including equipment, have been purchased. Twenty 20-ft. single-truck cars will be rebuilt into pay-as-you-enter or pay-within type, and electric heaters and other conveniences will be installed. An order has been placed with the Nachod Signal Company for signals to protect 4 miles of single track. The following list of machinery will be purchased for the new shops: A wheel press, grinding machine, boring machine, axle-straightening machine, axle key seater and a woodworking machine.

Terms of Pittsburgh Subway Ordinance

The terms of the subway ordinance that the public service and surveys committee of the Council of Pittsburgh, Pa., has agreed to accept have been made public. The subway bill as finally agreed upon is revised from the Chamber of Commerce bill, but differs materially from the measure recommended by that body. It is provided that the company shall charge not more than 5 cents fare for a continuous ride without the approval of the city to be expressed by ordinance. General plans of the proposed system are to be submitted within sixty days from the passage of the ordinance, and the plans or modifications are to be approved by the Council within ninety days thereafter. The board which is to supervise the operation of the system is to consist of three members, one to be appointed by the Mayor with the approval of the Council and paid by the city, a second to be selected by the company and paid a like salary by the company and a third to be appointed jointly by the Mayor and the company. This joint appointee is to be chairman of the board.

Within ten days after the approval of general plans for construction the company is to file a bond of $100,000 to guarantee preparation and filing of detail plans and specifications. After approval of the latter the company is to file another bond of $250,000 to guarantee commencement of construction within sixty days thereafter and the completion and operation of the road within four years. If the company fails to meet any of these conditions the franchise is to become void. Provisions are made for the uses to which the gross annual receipts of the company shall be appropriated. Out of any balance of income one-half of 1 per cent per annum on the approved cost of construction is to be deposited with the city treasurer to be placed in a sinking fund for the benefit of the city and at the option of the city to be used to purchase the property of the company and redeem or pay bonds thereon. At its option after twenty-five years, upon six months' notice, the city is to have the right to purchase the entire work and equipment for the cost of construction, plus the then appraised value of the equipment, plus 25 per cent of the construction account and the appraised value of the equipment.

Franchise Negotiations in Kansas City Suspended

The negotiations for a new franchise for the Metropolitan Street Railway, Kansas City, Mo., which were renewed following the election of Mr. Jost as Mayor, have been suspended owing to a disagreement in regard to the question of the valuation of $37,500,000 placed on the property of the company by the receivers. The Mayor issued a statement in part as follows:

"The representatives of the company, in answer to the request of the Mayor to submit a detailed statement of all property owned by the company, together with its value, submitted the valuation of the whole property, tangible and intangible, at $37,500,000. It is clear that this statement is made up of intangible claims which the representatives of the company contend should be considered.

"The representatives of the city suggested that the company employ an expert and such additional help as it desires and make an appraisal of the value of its own property, and collect information concerning such value; that the city employ an expert and such help as it desires to make an examination and collect information in behalf of the city in regard to the value of the company's property; that the two experts work independently of each other, each serving his own employer; that the entire information, data and conclusion of the two experts, as well as all information collected by both the railroad and the city, be submitted in the end to the Circuit Court of Jackson County, or, if desired by the railway, to one or three judges of the Circuit Court irrespective of politics, the Circuit Court to pass upon the information and evidence submitted by both parties and determine thereon what is the reasonable and fair value of the company's property for the purpose of making a new contract. This offer was declined by the representatives of the company.

"The company is asking the city for a new contract. The city is not asking for anything except that the company comply with the contract that already exists between the city and the company and which will not expire until 1925. The representatives of the company state that the company is unable to raise the money necessary to enable it to do the things which its present contract requires it to do.

"The Mayor and his advisers insist that the burden of showing that it is unable to comply with its present contract is on the company; that in negotiating a new contract, if a new contract is to be made, the matter of determining the value of this property is of vital importance and must be conducted and determined in such a way as to command the confidence and respect of the public. The representatives of the company proposed that the conclusions and information gathered by the experts be submitted to and passed upon by a judge of the Supreme Court of the United States, a judge of the Circuit Court of the United States and a judge of the Supreme Court of Missouri instead of three judges of the Circuit Court of Jackson County, Missouri.

"The attitude of the company's representatives was such that the Mayor feels that it is incumbent upon him to enforce the present contract existing between the city and the company and has instructed the city counselor to proceed to compel the company to yield obedience to the present franchise requirements of the city."

Ford F. Harvey and Robert J. Dunham, receivers of the company, issued the following statement:

"The receivers submitted to the city the proposition that negotiations be opened for a new contract and in compliance with the Mayor's demand submitted as a suggestion a valuation figure, with the offer that the same should be subject to arbitration of two experts, one to be selected by each party. The city declined to discuss the terms of any contract except upon the condition that the receivers agree in advance that the valuation of the property be fixed and determined by the judges of the Circuit Court of Jackson County, Missouri, as arbitrators. To this the receivers refused to agree because:

"(a) The property is now in the hands of the United States Circuit Court. Due respect and courtesy to that tribunal demand that the question of valuation be not submitted to the judges of another court. It is probable that the judges of the State court would in such circumstance refuse to act. This does not mean that Judge Hook fix the value. No such suggestion is or was made.

"(b) The valuation should be speedily determined by outside experts of national character and standing. They should be wholly independent of any court. If they cannot agree as to any item, let them choose a third person to decide the question of difference; or let each party elect an expert and after they make report the parties can then endeavor to agree upon any disputed item.

"(c) There are interested in the property the bondholders, who have underlying mortgages on lines which can be separately operated at separate fares, and the owners of the Kansas City & Westport Belt, which, having been built before the city limits were extended, has no need for a franchise. Financiers must furnish large sums for needed extensions, and about $1,500,000 per year for betterments during the period of any new franchise. Even if the receivers would agree, these persons would not consent that the value of their property should in advance, without knowledge of the character of the contract to be made, be fixed by citizens of the community—this without the right to appeal.

"(d) If outside judges are to be selected to fix this value, they should be selected from outside of the community. The receivers expressed a willingness, subject to court's approval, to agree that the matter be determined by one justice of the Supreme Court of the United States, one from the Supreme Court of Missouri and one from the United States Circuit Court of Appeals. This suggestion was rejected by the city."

New Disposition of Rapid Transit Lines in New York

At a conference on May 14, 1912, between the transit committee of the Board of Estimate of New York and the members of the Public Service Commission, First District, a new disposition of the new rapid transit lines to serve the financial district and to provide access to Brooklyn was adopted. It was proposed by Alfred Craven, chief engineer of the commission, as a compromise, and was pronounced acceptable by the engineers of both the Brooklyn Rapid Transit Company and the Interborough Rapid Transit Company. The Brooklyn Rapid Transit Company is to get the Whitehall Street-Montague Street tunnel. It will connect by Morris Street with the southern end of its Broadway line, which at this point is in Trinity Place, and the extension of the loop line will run into it. The loop line will, however, now run down Nassau and Broad Streets, and not William Street, as had been suggested before. The Interborough Rapid Transit Company will get the Old Slip-Clark Street tunnel, which the commission had before assigned to the Brooklyn Rapid Transit Company. The Clark Street line will be connected at Park Place with the Seventh Avenue line of the Interborough Rapid Transit Company, which at this point is in West Broadway, and will run across City Hall Park at Mail Street, through Beekman Street to William, and down that thoroughfare to Old Slip. It will probably have a station at Mail Street, perhaps connecting with the present City Hall subway station, and two others at Fulton and Wall Streets.

In addition, the conferees agreed to permit the Brooklyn Rapid Transit Company the physical connection it has desired between its Canal Street and its Broadway lines. This will be accomplished by running the crosstown line from Manhattan Bridge on the second level under the loop line and the present subway as far as the Canal Street station to be built for the Broadway line. There it will turn north, and will rise slowly to the first level, to connect with the Broadway tracks at about Howard Street. This connection is to be made at the sole expense of the Brooklyn Rapid Transit Company and will cost about $500,000. Provision will also be made for the extension of the Canal Street crosstown line at some future date through to the North River.

Other routes settled are in connection with the Steinway Tunnel and the Queensboro Bridge Plaza, the Eastern District (Brooklyn) system and the Fourteenth Street tunnel, other routes in Brooklyn, and the tunnel from Sixty-fifth Street, Brooklyn, to Staten Island.

The formal agreement was drawn up and signed by the conferees, Chairman Willcox, Commissioners Maltbie, Eustis and Williams, and Borough Presidents McAneny, Miller and Cromwell.

Ordinance to Require Improvements in Richmond, Ind.—The City Council of Richmond, Ind., has voted to revoke the franchise of the Terre Haute, Indianapolis & Eastern Traction Company to operate a city service provided improvements are not made and new cars purchased within ninety days.

New List of Members of the C. E. R. A.—The Central Electric Railway Association, Indianapolis, Ind., issued under date of May 1, 1912, Yellow Book No. 2, which contains a list of the members of the association for 1912, including the supply members. Yellow Book No. 3 supersedes Yellow Book 2.

New Orleans Company Subscribes to Exposition.—The directors of the New Orleans Railway & Light Company, New Orleans, La., on April 29, 1912, voted to subscribe for $10,000 of the stock of the Southern States Fair and Panama Exposition, which is to be held at New Orleans. Up to that time this was the largest single subscription to the exposition.

Contract Awarded for Another Section of New York Subway.—The Public Service Commission of the First District of New York has awarded a contract for the construction of Section 14 of the Lexington Avenue subway to Arthur McMullen, the lowest bidder, for $3,889,775. This section is 3176 ft. long and extends under the Harlem River from 129th Street to 135th Street. The contract is for construction according to one of three alternative plans allowed by the commission, and it calls for four steel tubes laid in one bed of concrete.

Report on Twin Peaks Tunnel in San Francisco.—B. J. Arnold has just submitted to the Board of Supervisors of San Francisco preliminary report No. 5 on the proposed tunnel under the Twin Peaks ridge. In his conclusions he recommends various alternative plans, all looking to the construction of such a tunnel. He states that it will bring within thirty minutes' running time of the business district of San Francisco approximately 10,000 acres of territory which has hitherto been practically useless because of lack of adequate transportation facilities.

Payment of Last of Barcroft Appraisal Claims Urged in Detroit.—Joseph Boyer, who was chairman of the committee of fifty which was appointed by former Mayor Breitmeyer, of Detroit, Mich., to formulate a plan for the settlement of the street railway question, has asked Mayor Thompson to take steps to induce the City Council to authorize the payment of debts which aggregate $1,200 incurred at that time. They include salaries of nine engineers who aided Engineer F. T. Barcroft in appraising the property. The claims of the engineers were not included in the expense account rendered by Mr. Barcroft.

Objection by Company to Provisions of Toledo Grant.—The Toledo Railways & Light Company has objected to the terms of the ordinance drawn by the city solicitor which provide for a double track on a portion of Monroe Street. One section of the ordinance declares that all franchises and rights of the company on Monroe Street expired on Nov. 10, 1910, and that the street is occupied by suffrance only. F. R. Coates, president of the company, states that the company is willing to make the improvements which are specified, but that the company cannot accept an ordinance which says anything about the expiration of franchises.

Portland Blanket Franchise Approved in Committee.—The street committee of the City Council of Portland, Ore., has approved the blanket street railway franchise sought by the Portland Railway, Light & Power Company, covering nearly 19 miles of streets. The clause has been eliminated which was drawn to grant the Council the right reasonably to regulate fares, which City Attorney Grant recommended should be in the franchise, and to which the officials of the company objected. The clause granting the company a franchise across the Broadway bridge has also been eliminated, but the provision for common-user privileges to other companies which desire to operate over the streets covered by the grant has been retained.

Completion of Galveston Causeway.—The construction of the 2-mile concrete causeway, which makes a peninsula of Galveston Island, has been completed. It is proposed to celebrate the opening of the causeway on May 25 with public exercises, in which Governor O. B. Colquitt will participate. The causeway provides a broad headway for railroad and interurban tracks, automobiles and horse-drawn vehicles and foot passengers. Midway in the concrete span there is a roller lift bridge to permit the passage of liners to the inner harbor. An inclined roadway leads from the island end of the causeway to the heart of Galveston. The cost of the structure was $2,500,000, and was borne jointly by the city and the utilities.

Rapid Transit Routes Approved in New York.—The Board of Estimate of New York has approved the William and Beaver Street, East River and Clark Street route, part of the dual system of subways transmitted by the Public Service Commission of the First District of New York. The route embraces a tunnel under the East River from William Street near Beekman Street in Manhattan to Clark Street and Fulton Street, Brooklyn, with a loop spur in Manhattan in Beaver Street and under Old Slip. A spur is also provided for in Trinity Place, where connection can be made with Section 5D of the Lexington Avenue route. The approval also embraces plans and conclusions for the construction of the subways mentioned. Mayor Gaynor has returned duly approved to the Board of Estimate resolutions adopted by the board approving the plans and conclusions and consenting to the construction of two additional rapid transit railways, namely, the Steinway Tunnel-Times Square extension and the Seventh Avenue extension, Varick Street route. The Public Service Commission will now advertise for bids for the construction of these two extensions.

Conference Asked in Regard to Steinway Tunnel.—The Interborough Rapid Transit Company has asked for a conference between its counsel, counsel to the commission and the Attorney-General to consider the status of the litigation over the Steinway Tunnel. This tunnel, which runs from Forty-second Street, Manhattan, under the East River to Long Island City, has been practically completed for the last four years, but has never been operated. It is held by trustees of the New York & Long Island Railroad, which is controlled by the Interborough Rapid Transit Company. Some time ago, at the request of the commission, the Attorney-General started suit to oust the trustees from the possession of the tunnel and to turn the same over to the city. Since that time the Interborough Rapid Transit Company has made a proposition to build certain portions of the proposed dual system of rapid transit extension and to operate the same and other lines, to be built by the city. A part of this proposition is to turn over the Steinway Tunnel to the city for a consideration of $3,000,000. According to the company's estimates the tunnel cost about $8,000,000. Under the proposed dual plan it is to be connected with the existing subway and operated as a part of the subway system. In view of this proposition, the Interborough Rapid Transit Company thinks that the ouster suit started by the Attorney-General should be suspended and has asked for the conference to consider this question. The commission has not yet acted upon the request.

LEGISLATION AFFECTING ELECTRIC RAILWAYS

MASSACHUSETTS

The committee on railroads has reported a bill authorizing the lease of the Boston & Maine Railroad to the New York, New Haven & Hartford Railroad under the title "New England Lines." The bill provides for the electrification of the railroads of standard gage within the Boston metropolitan park district inside of six years, subject to the jurisdiction of the Railroad Commission. It also dissolves the Boston Railroad Holding Company and provides for the construction of one or more tunnels connecting the two systems at Boston.

On the bill authorizing the Haverhill & Southern New Hampshire Street Railway to purchase the franchises and property of the independent lines in northeastern Massachusetts and southern New Hampshire, the House fought out the question of whether the Supreme Court should receive the power to review the facts on an appeal from the decision of the Ralroad Commission. The question was of particular importance because it is one of the principal issues to be raised in the New Haven electric railway merger

bill now before the committee on ways and means. An amendment by Representative Washburn struck out from the bill as it came from the Senate the power of the Supreme Court after a hearing de novo, "to limit, suspend, modify or set aside" any order made by the commission. The amendment was carried by a vote of eighty-eight to thirty-four. The bill gives the commission power to fix fares, equipment and service on the lines in question.

PROGRAMS OF ASSOCIATION MEETINGS

New England Street Railway Club

The regular monthly meeting of the New England Street Railway Club will be held at Young's Hotel, Boston, Mass., on the evening of May 22. Dinner will be served at 6:30 o'clock. After the regular business meeting of the club an address will be delivered by Gregory C. Davison, mechanical engineer of the New London Ship & Engine Company, New London, Conn., who will speak on the subject "American-Nurnberg Heavy Oil Engines."

Arkansas Association of Public Utility Operators

The fifth annual convention of the Arkansas Association of Public Utility Operators will be held at Little Rock, Ark., on May 20, 21 and 22, 1912. Among the papers of special interest to railway officers which are to be presented are the following:

"Water Power in Arkansas," by E. C. Bellamy, general manager of the Mammoth Springs Electric Light & Power Company.

"Recent Electrical Developments," by Prof. N. M. Gladson, of the electrical engineering department of the University of Arkansas.

"Depreciation," by W. L. Wood, secretary and manager of the Texarkana Gas & Electric Company.

Illinois Electric Railways Association

The next meeting of the Illinois Electric Railways Association will be held at Hotel Leland, Springfield, Ill., on May 18, at 11 a. m. The program arranged for this meeting will be devoted entirely to block signals. Preparatory to this the signal committee has held meetings and will present an exhaustive report, which will be discussed. H. E. Chubbuck, president of the association, has arranged a trip to inspect the signal system installed upon his lines. The members of the association have been invited to come to Peoria and go from there to Springfield on the special train which Mr. Chubbuck will provide. The special will leave Peoria at 8 a. m. on May 18. A full attendance at this meeting is desirable that final action may be taken on the previous report of the traffic committee covering the adoption of an interchangeable coupon ticket and constitution and by-laws of the traffic association.

Gas, Electric & Street Railway Association of Oklahoma

The first annual convention of the Gas, Electric & Street Railway Association of Oklahoma will be held in Oklahoma City on May 22 and 23. Among the papers to be presented are the following:

"Crude Oil as a Fuel in Place of Coal," by R. E. Chandler, Stillwater.

"Gas Engines," by P. M. Galloway, manager of the Tulsa Corporation, Tulsa.

"Efficiency and Operation of Tungsten Lamps for Street Lighting," by C. E. Lahman, manager of the Vinita Ice, Light & Power Company, Vinita.

"Notes on the Economical Operation of Small Central Stations," by H. H. Stephens, manager of the El Reno Gas & Electric Company, El Reno.

"Necessities for Standardization of Equipment," by C. W. Day, master mechanic of the Oklahoma Railway, Oklahoma City.

At a smoker which will be held on the evening of May 22 at Belle Isle Park, Jack Love, chairman of the Oklahoma State Corporation Commission, and F. H. Tidnam, second vice-president of the Oklahoma Gas & Electric Company, will make addresses.

Financial and Corporate

Stock and Money Markets

May 15, 1912.

Many of the issues which are generally inconspicuous in the business on the New York Stock Exchange were in evidence in the market to-day. While a few of the leading issues were prominent toward the close, there were net losses in some of the stocks which have figured in the recent dealings. There was considerable strength in the local traction issues. This was attributed to the prospects of a favorable agreement in regard to the subway situation. Brooklyn Rapid Transit and Interborough-Metropolitan preferred gained more than a point. Rates in the money market were: Call, 2½@3 per cent; sixty days, 3@3¼ per cent; ninety days, 3¼@3½ per cent.

In the Philadelphia market there was some trading in Lehigh Valley Transit Company shares, which displayed firmness. The dealings in bonds were quite diversified.

In the Chicago market Chicago City & Connecting Railways 5's sold at a decline of two points. Chicago Railways 4's were a feature.

In the Boston market there was very little interest in the trading, but the general tone was firm.

In the Baltimore market the conspicuous feature was the demand for bonds. Important sales were recorded of United Railway 4's and Baltimore City 3½'s.

Quotations of traction and manufacturing securities as compared with last week follow:

	May 8.	May 15.
American Brake Shoe & Foundry (common)	a96¼	a96¼
American Brake Shoe & Foundry (preferred)	a136½	a137
American Cities Company (common)	..	..
American Cities Company (preferred)	..	..
American Light & Traction Company (common)	a301	a302
American Light & Traction Company (preferred)	a110	a110
American Railways Company	a44	a44
Aurora, Elgin & Chicago Railroad (common)	a46½	a46½
Aurora, Elgin & Chicago Railroad (preferred)	86¾	86
Boston Elevated Railway	a128	128
Boston Suburban Electric Companies (common)	a15	a15
Boston Suburban Electric Companies (preferred)	a81¼	a81¼
Boston & Worcester Electric Companies (common)	a10½	a10½
Boston & Worcester Electric Companies (preferred)	52	a54
Brooklyn Rapid Transit Company	82¼	85¾
Capital Traction Company, Washington	128	a128¼
Chicago City Railway	a190	a190
Chicago Elevated Railways (common)	a40	a40
Chicago Elevated Railways (preferred)	a93	a93
Chicago Railways, ptcptg., ctf. 1	a95	a98
Chicago Railways, ptcptg., ctf. 2	a33	a32
Chicago Railways, ptcptg., ctf. 3	a10½	a10
Chicago Railways, ptcptg., ctf. 4	a5	a5
Cincinnati Street Railway	a130	a130
Cleveland Railway	a105½	a106
Cleveland, Southwestern & Columbus Ry. (common)	a5	*5
Cleveland, Southwestern & Columbus Ry. (preferred)	a32	*32
Columbus Railway & Light Company	a55	a55
Columbus Railway (common)	80	80
Columbus Railway (preferred)	a94	a93½
Dayton Street Railway (common)	a25	a25
Dayton Street Railway (preferred)	a100	a100
Denver & Northwestern Railway	135	*135
Detroit United Railway	a70	a75
General Electric Company	167	170⅛
Georgia Railway & Electric Company (common)	a127	a127
Georgia Railway & Electric Company (preferred)	86½	a85½
Interborough Metropolitan Company (common)	18¾	20¼
Interborough Metropolitan Company (preferred)	56⅛	59¼
International Traction Co. 4% bonds, rcts	*75	*75
Indiana Union Traction Company	a7	7
Kansas City Railway & Light Company (common)	a22	a21
Kansas City Railway & Light Company (preferred)	a52	a48½
Lake Shore Electric Railway (common)	a7	7
Lake Shore Electric Railway (1st preferred)	a91½	91½
Lake Shore Electric Railway (2d preferred)	a27	27
Manhattan Railway	a137	a137
Massachusetts Electric Companies (common)	a19	a20
Massachusetts Electric Companies (preferred)	a93½	a95½
Milwaukee Electric Railway & Light (preferred)	a104½	*104½
Norfolk Railway & Light Company	*27	*27
North American Company	81⅝	a83
Northern Ohio Light & Traction Company (common)	a67½	a70
Northern Ohio Light & Traction Company (preferred)	a102½	a103½
Philadelphia Company, Pittsburgh (preferred)	a53	a52⅞
Philadelphia Company, Pittsburgh (common)	a44	a44
Philadelphia Rapid Transit Company	a22¼	a23
Portland Railway, Light & Power Company	*68½	*68½
Public Service Corporation	a111½	a112
Third Avenue Railway, New York	36¼	40½
Toledo Railways & Light Company	a9	a10
Twin City Rapid Transit Co., Minneapolis (common)	a106	a106
United Rys. & Electric Company (Baltimore)	a22¼	*22¼
United Rys. Inv. Co. (common)	a33½	32¾
United Rys. Inv. Co. (preferred)	a61½	a61¾
Virginia Railway & Power Company (common)	49	a49⅞
Virginia Railway & Power Company (preferred)	88	88
Washington Ry. & Electric Company (common)	84½	a90
Washington Ry. & Electric Company (preferred)	95	a96½
West End Street Railway, Boston (common)	a84½	a85
West End Street Railway, Boston (preferred)	100¼	a101½
Westinghouse Elec. & Mfg. Co.	74¼	a76
Westinghouse Elec. & Mfg. Co. (1st preferred)	a122	a121

*Last sale. a Asked.

ANNUAL REPORT

Hudson & Manhattan Railroad

The income account of the Hudson & Manhattan Railroad for the year ended March 31, 1912, with a comparison with the previous year, follows:

	1912.	1911.
Gross revenue—passenger fares	$3,014,861	$2,546,349
Miscellaneous revenue from railroad operations:		
Advertising	142,078	106,607
Other car and station privileges	51,249	30,835
Sale of power	7,299	5,839
Miscellaneous transportation revenue	25	†141
Other miscellaneous revenue	6,331	5,554
Total miscellaneous railroad revenue	$206,982	$148,691
Total railroad revenue	$3,221,843	$2,695,040
Maintenance of way and structures—		
Actual	$171,155	$143,653
Reserve	58,110	58,110
Maintenance of equipment—		
Actual	89,139	87,570
Reserve	29,601	29,601
Traffic expenses	13,851	40,490
Transportation expenses	745,540	639,671
General expenses	114,075	91,074
Total operating expenses of railroad	$1,221,471	$1,090,169
Net operating revenue from railroad	2,000,372	1,604,871
Taxes on railroad operating properties	200,298	164,462
Net income from railroad operation	$1,800,074	$1,437,409
Net income from Hudson Terminal Buildings	925,814	861,025
Net income from Greenwich & 10th St. properties	2,621	2,837
Total net income from outside operations	$928,435	$863,862
Total net income from all operat'g sources	$2,728,509	$2,301,271
Non-operating income	20,964	13,781
Gross income	$2,749,473	$2,315,052
Income deductions:		
Interest on total interest-bearing bonds	$2,951,427	$2,918,007
Less interest chargeable to construction	535,985	819,192
Balance, being interest on capital employed in operation and chargeable against income	$2,415,442	$2,098,815
Interest on car purchase agreements	68,717	48,200
Interest on real estate mortgage	2,100	525
Interest on loans payable	5,492	
Rental, city of New York	59,873	49,789
Rental, tracks, yards and terminals	101,507	127,841
Amortization of debt discount	46,063	31,772
Total income deductions	$2,699,194	$2,356,942
Net income carried to corporate surplus account	50,279	*41,890

*Deficit. †Credit.

W. G. McAdoo, the president, says in part in his report:

"The property of the company has been maintained during the year at the same high standard of efficiency. Outside of the completion of your company's portion of the high-speed line to Newark, N. J., no new work was undertaken during the year except the construction of an additional platform at the Erie station, where the increase of traffic and the necessity for improvement in operating conditions made an additional platform essential. This work should be completed during the summer of 1912.

"On April 18, 1906, your company and the Pennsylvania Railroad entered into an agreement for the establishment of a joint through train service between the Hudson terminal and a new station to be built by the Pennsylvania Railroad in Newark. Each company furnishes the track and facilities for its parts of the line and its proportion of equipment for its operation, and the earnings and expenses are prorated on an equitable basis.

"On Oct. 1, 1911, the first trains began to run between the Hudson terminal and Manhattan Transfer, and on Nov. 26, 1911, the service was extended into the new station at Park Place, Newark. Since then the Pennsylvania Railroad has discontinued a large number of its steam trains between Manhattan Transfer and its old station at Exchange Place, Jersey City. All Pennsylvania Railroad trains to the downtown section of New York are now scheduled to and from the Hudson terminal, which has become in effect the downtown New York terminal of the Pennsylvania System. One of the important stations on this line, namely, at Summit Avenue, Jersey City, has not yet been completed, but a temporary facility at that point was opened for public use on April 14, 1912. It is expected that the permanent station (which, under the agreement, is being built by the Pennsylvania Railroad) will be completed about Aug. 1, 1912. The Public Service Corporation of New Jersey is building a commodious and excellent terminal adjacent to the Summit Avenue station and purposes to operate a large number of its existing lines to that point. Under this plan a new and distinctively advantageous service between the residential district of Jersey City and downtown and uptown New York will be provided. It will put this district within eight minutes of the Hudson terminal and within nineteen and one-half minutes of Thirty-third Street and Broadway, giving it a marked advantage in point of time and convenience of access over any other residential district in and around the principal centers of New York City, which should result in a rapid growth of the entire Bergen Hill section of Jersey City. The Newark Rapid Transit Line also provides a frequent and rapid through train service to New York, the running time from Park Place, Newark, to Hudson terminal being only twenty minutes. Its effect upon the future of Newark will be more pronounced as time goes on. The traffic results have thus far been entirely satisfactory and give promise of large future growth.

"On Aug. 1, 1911, your company purchased thirty-six additional steel passenger cars, being its portion of the equipment required for the joint service to Newark, under a purchase agreement with the Guaranty Trust Company of New York, which has issued its car purchase certificates, series C, against this equipment. The principal is payable in semi-annual instalments upon a similar plan to that of series A and series B car purchase certificates, heretofore issued.

"The value and importance of the Hudson terminal has increased during the year. The office buildings have retained their popularity to such an extent that all available space was rented during the year. The demand for space has exceeded the supply.

"In order to meet this demand and more fully to protect the buildings on the west, it was considered desirable to purchase from Hudson Companies additional real estate between Dey and Cortlandt Streets, adjoining 30 Church Street on the west, and an additional lot on Dey Street, adjoining 50 Church Street on the west, and to erect thereon two six-story structures. The work was begun in the fall of 1911, and the buildings will be ready for occupancy on or about May 1, 1912. Eighty-five per cent of the space in these additions has been rented, and it is expected that they will be fully occupied before the end of the next fiscal year. On the basis of cost of land and buildings, the company will receive a net income more than sufficient to carry them, and at the same time the light of the main buildings has been satisfactorily protected.

"No work has yet been begun on the Grand Central extension or the Ninth Street extension, these being in the same position as stated in the last annual report. It would be unwise to determine upon the final plans for these extensions or to do any work upon them until the general subway plans for New York have been definitely settled.

"In Nov., 1911, your directors reached the conclusion that it would be advisable to increase the rate of fare on the uptown line from 5 cents to 7 cents. Accordingly, a tariff was filed with the Interstate Commerce Commission at Washington, and the new rate became effective on Dec. 24, 1911, with satisfactory results.

"Carrying out the policy heretofore adopted of charging against income a larger proportion of interest on the company's debt as new additions, extensions and facilities were put into operation, there has been charged against income for the months of January, February and March interest on $60,000,000 of funded debt, as against $50,000,000 for the same months of 1911. Beginning with April 14, 1912, the date of the opening of the Summit Avenue station, there will be charged against operating income, interest on $65,000,000 of outstanding bonds. There are outstanding an additional $6,423,000 of first mortgage 4½ per cent bonds, but, by agreement with the Hudson Companies, the owner of these bonds, no interest is to be paid thereon until Feb. 1, 1914, after which said bonds will bear interest at 4½ per cent per annum until maturity and will receive an additional 2 per cent per annum to Feb. 1, 1920, if and to the extent that said additional 2 per cent may be earned.

"There has been charged off, as part of operating expenses, and accrued as a depreciation and amortization reserve up to March 31, 1912, in addition to actual expenditure for maintaining the property at the highest point of efficiency, the sum of $512,794.

"The traffic for the year has shown a gratifying increase over the previous year. The total number of 5-cent fares collected was 57,416,950. The total number of 2-cent fares collected was 7,927,941. The 2-cent rate had been in effect for three months and eight days. Equating the 2-cent fares on a 5-cent basis, makes the total number of passengers carried on a 5-cent basis, for the fiscal year ending March 31, 1912, 60,588,126. The number of passengers carried on a 5-cent basis for the fiscal year ending March 31, 1911, was 50,926,980. The increase, therefore, was 9,661,146. Traffic statistics for the last two years are given in the following table:

Year ended March 31.	1912.	1911.
Average miles of road operated	7.569	6.663
No. of revenue car miles operated	7,335,733	6,592,271
Passenger revenue	$3,014,861.26	$2,546,349.00
Miscellaneous railroad revenue	206,982.49	148,690.59
Gross railroad operating revenue	$3,221,843.75	$2,695,039.59
Operating expenses (excluding taxes)	1,221,471.73	1,090,168.63
Net railroad operating revenue	$2,000,372.02	$1,604,870.96
Passenger traffic:		
No. of passengers carried	57,416,950	50,926,980
No. of passengers carried per mile of road	7,585,804	7,643,251
No. of passengers per revenue car mile	7.83	7.73
Revenues and operating expenses:		
Passenger revenue per mile of road	$398,316.99	$382,162.54
Gross rail'd operat'g rev. per mile of road	425,663.06	404,478.40
Oper. exp. (exclud'g taxes) per mile of r'd	161,378.20	163,615.28
Net rail'd operat'g rev. per mile of road	264,284.86	240,863.12
Passenger revenue per revenue car mile	0.4110	0.3863
Gross rail'd oper. rev. per rev. car mile	0.4390	0.4088
Op. exp. (excl'd'g taxes) per rev. car mile	0.1665	0.1653
Net rail'd oper. rev. per rev. car mile	0.2725	0.2435
Passenger revenue per passenger	0.0525	0.05
Gross rail'd operat'g rev. per passenger	0.0561	0.0529
Oper. exp. (exclud'g taxes) per passenger	0.0213	0.0214
Net rail'd operat'g revenue per passenger	0.0348	0.0315

American Railway & Lighting Company, Dallas, Tex.—Interests identified with the General Electric Company have acquired control of the American Railway & Lighting Company, Dallas, Tex. Within a short time a new holding company to take over these properties and others will be organized. It is said that the new corporation will be known as the Texas Power & Light Company. The American Railway & Lighting Company was organized in 1906 by J. F. Strickland, Dallas, Tex., John Auchincloss, New York, and a number of Texas men. It was intended to include in it, besides the lighting and power companies, several electric railroads in Texas, built and operated by the Strickland interests, but this was not done and the railroads are operated independently. The company has an outstanding capitalization of $960,000 common stock and $300,000 of 6 per cent preferred stock, with $500,000 of 5 per cent bonds. These bonds are secured by the deposit of $625,000 of bonds of underlying companies. The company controls, through stock ownership, the Bonham Electric & Gas Company, the Cleburne Electric & Gas Company, the Hillsboro Electric & Gas Company, the Sherman Electric & Gas Company, the Dublin Electric & Gas Company and other gas and electric corporations in Texas. It is the intention to erect a central power station at a cost of $1,000,000 at Waco and current will be distributed within a radius of 75 miles from that city.

American Railways, Philadelphia, Pa.—William C. Sproule has been elected a director of the American Railways to fill the vacancy on the board caused by the death of William F. Harrity.

Angola Light & Power Company, Angola, Ind.—The Angola Light & Power Company, the incorporation of which was noted in the ELECTRIC RAILWAY JOURNAL of Dec. 2, 1911, page 1177, has succeeded the Angola Railway & Power Company, which was in the hands of Frederick S. Hunting as receiver. Officers have been elected for the Angola Light & Power Company as follows: John Dribbelbliss, president; L. S. Nold, auditor; C. W. Morse, general manager and purchasing agent; Carl Weiss, chief engineer and master mechanic, and T. H. Gibbs, electrical engineer.

Citizens' Traction Company, Oil City, Pa.—The Citizens' Traction Company has called for payment on July 1, 1912, at 105 and interest, at the office of the Pennsylvania Company for Insurance on Lives and Granting Annuities, all of the outstanding $736,000 of first mortgage 5 per cent bonds issued under the mortgage dated July 1, 1905.

Clarksville Railway & Light Company, Clarksville, Tenn.—Montgomery, Clothier & Tyler, Philadelphia, Pa., who were noted in the ELECTRIC RAILWAY JOURNAL of May 4, 1912, page 771, as having taken over the property of the Clarksville Railway & Light Company, announce that the purchase was made in the interest of the Kentucky Public Service Company, but that the railway will not be operated by the new organization, but will be leased to a separate company.

Dedham & Franklin Street Railway, Westwood, Mass.—Owing to a typographical error the name of the receiver appointed for the Dedham & Franklin Street Railway and the Medfield & Medway Street Railway was incorrectly given as Eugene H. Mother, Brookline, Mass., in the ELECTRIC RAILWAY JOURNAL of May 11, 1912, page 807, instead of Eugene H. Mather.

Illinois Northern Utilities Company, Chicago, Ill.—Russell, Brewster & Company, New York, N. Y., and N. W. Halsey & Company, New York, N. Y., are offering for subscription at 95 and interest $1,600,000 of first and refunding mortgage 5 per cent gold bonds of the Illinois Northern Utilities Company dated April 1, 1912, and due April 1, 1957. The interest on the bonds is payable semi-annually on April 1 and Oct. 1 at the office of the Illinois Trust & Savings Bank, Chicago, Ill., trustee, and the bonds are redeemable at the option of the company as a whole or in part on any interest payment day at 105 and interest. The Illinois Northern Utilities Company was referred to in the ELECTRIC RAILWAY JOURNAL of May 11, 1912, page 807, as having acquired control of the Stirling, Dixon & Eastern Electric Railway, the Lee County Lighting Company, Dixon, Ill., and several other electric companies. The territory served by the company adjoins on the west the territory served by the Public Service Company of Northern Illinois, the two companies being operated under practically the same management. The Illinois Northern Utilities Company has outstanding $4,635,000 of common stock and $1,808,000 of 6 per cent cumulative preferred stock. The total issue of first and refunding mortgage 5 per cent bonds outstanding is $1,632,000. There are underlying bonds on portions of the property to the amount of $818,000, but a sufficient amount of first and refunding 5's is reserved with the trustee to retire the underlying bonds. By Sept. 1, 1912, it is proposed to reduce the underlying bonds outstanding to $450,000, after which the mortgage securing the first and refunding bonds will be a first lien on property producing approximately 75 per cent of the gross earnings of the company. Samuel Insull, president of the Commonwealth Edison Company, Chicago, Ill., is president of the Illinois Northern Utilities Company.

Indianapolis, Crawfordsville & Danville Electric Railway, Crawfordsville, Ind.—The Indianapolis, Crawfordsville & Danville Electric Railway, the successor to the Indianapolis, Crawfordsville & Western Traction Company, the property of which was sold under foreclosure recently, has filed for record a mortgage for $2,500,000 in favor of the Girard Trust Company, Philadelphia, Pa., as trustee.

Indiana Union Traction Company, Anderson, Ind.—The injunction suit filed in the federal court in Indianapolis to prevent the merger of the Indiana Union Traction Company and the Union Traction Company of Indiana has been dismissed. As stated in the ELECTRIC RAILWAY JOURNAL of May 4, 1912, page 771, the plan to consolidate the two companies and to scale down their capital was carried at the meetings of the stockholders on April 25, 1912.

Morris County Traction Company, Morristown, N. J.—The Morris County Traction Company has applied to the Board of Public Utility Commissioners of New Jersey for permission to make a new mortgage to secure an issue of $5,000,000 of bonds, $3,000,000 of the new issue to be used to retire outstanding bonds and the remaining $2,000,000 to be used to cancel floating debt and to finance new construction.

Northampton, Easton & Washington Traction Company, Easton, Pa.—W. L. Doyle, secretary of the committee of creditors of the Northampton, Easton & Washington Traction Company which has been in charge of the affairs of the company for several months, has drawn up a plan for refinancing the company which is said to meet the approval of the directors of the company and more than two-thirds

of the stockholders. A meeting of the creditors was held in Trenton on May 4, 1912, and while the details of the plan for refinancing were not made public it was announced at the close of the conference that a settlement would probably be effected in the near future.

Northern Texas Electric Company, Fort Worth, Tex.—The Northern Texas Electric Company, a Maine corporation, has filed a notice of an increase in the authorized capital stock of the company from $6,000,000 to $7,000,000 by the addition of $1,000,000 of preferred stock.

Seattle, Renton & Southern Railway, Seattle, Wash.—Scott Calhoun, whose appointment as temporary receiver of the Seattle, Renton & Southern Railway was noted in the Electric Railway Journal of May 11, 1912, page 808, has been discharged by Judge Frater in the Superior Court, who held that the statements prepared by accountants did not show that the road was insolvent. The application for the appointment of a receiver was made by William R. Crawford, formerly president of the company.

Third Avenue Railway, New York, N. Y.—On May 21, 1912, the Public Service Commission of the First District of New York will hold a hearing on the application of the Third Avenue Railway for permission to acquire certain stocks and bonds of various subsidiary companies now controlled by it and for permission to sell bonds authorized by the plan of reorganization to pay for the securities so taken over.

Trenton & Mercer County Traction Company, Trenton, N. J.—The State Board of Public Utility Commissioners of New Jersey has authorized the Trenton & Mercer County Traction Corporation to issue $43,000 in notes in favor of the Wilmington (Del.) Trust Company to provide funds to purchase ten new cars, the order for which was placed some time ago.

United Light & Railways Company, Grand Rapids, Mich.—The United Light & Railways Company is reported to have sold to a syndicate $4,375,000 of first and refunding 5 per cent bonds of the company in connection with the plan to finance the purchase of the holdings of the Tri-City Railway & Light Company and other properties, to which reference was made in the Electric Railway Journal of March 16, 1912, page 441.

ELECTRIC RAILWAY MONTHLY EARNINGS

CLEVELAND, PAINESVILLE & EASTERN RAILROAD

Period			Gross Earnings.	Operating Expenses.	Net Earnings.	Fixed Charges.	Net Surplus.
1m.,	Mar.,	'12	$24,728	*$15,150	$9,578	$9,758	†$180
1 "	"	'11	24,075	*13,887	10,188	8,172	†2,016
3 "	"	'12	69,353	*46,004	23,349	29,717	6,368
3 "	"	'11	68,242	*40,453	27,789	24,520	3,270

CLEVELAND, SOUTHWESTERN & COLUMBUS RAILWAY.

1m.,	Mar.,	'12	$86,529	$54,525	$32,004	$30,149	$1,855
1 "	"	'11	84,315	50,285	34,031	30,164	3,866
3 "	"	'12	243,943	158,812	85,131	90,468	5,045
3 "	"	'11	240,382	144,280	96,104	90,058	6,045

FAIRMONT & CLARKSBURG TRACTION COMPANY.

1m.,	Mar.,	'12	$63,180	$24,391	$38,789	.....	.....
1 "	"	'11	53,300	18,767	34,553	.....	.....
3 "	"	'12	178,005	72,005	105,617	.....	.....
3 "	"	'11	155,426	54,031	101,395	.....	.....

HUDSON & MANHATTAN RAILROAD

1m.,	Mar.,	'12	$455,691	$193,746	$261,945	$255,924	$6,021

ILLINOIS TRACTION COMPANY.

1m.,	Mar.,	'12	$591,963	*$356,975	$234,988	.....	.....
1 "	"	'11	553,758	*352,247	201,511	.....	.....
3 "	"	'12	1,795,430	*1,073,087	722,341	.....	.....
3 "	"	'11	1,662,787	*1,015,096	647,690	.....	.....

KENTUCKY TRACTION & TERMINAL COMPANY.

1m.,	Mar.,	'12	$56,173	$32,954	$19,543	$17,177	$6,042
1 "	"	'11	49,264	40,682	5,869	20,131	11,548

LAKE SHORE ELECTRIC RAILWAY.

1m.,	Mar.,	'12	$92,120	*$58,946	$33,175	$34,769	†$1,594
1 "	"	'11	86,528	*49,821	36,707	34,790	†1,917
3 "	"	'12	261,391	*170,796	90,595	104,194	†13,598
3 "	"	'11	247,356	*147,310	100,046	104,200	†4,155

NORTHERN OHIO TRACTION & LIGHT COMPANY.

1m.,	Mar.,	'12	$215,889	*$125,279	$90,610	$43,821	$46,790
1 "	"	'11	190,187	*110,850	79,336	44,329	35,007
3 "	"	'12	623,487	*367,370	256,118	191,466	124,651
3 "	"	'11	548,871	*322,623	226,248	133,116	93,134

VIRGINIA RAILWAY & POWER COMPANY.

1m.,	Mar.,	'12	$362,372	$194,578	$167,794	$4,992	$172,786
1 "	"	'11	347,126	199,370	147,756	2,602	150,358

*Includes taxes. †Deficit.

Traffic and Transportation

Advertising Campaign in Detroit

The Detroit United Railway, Detroit, Mich., has begun a series of advertisements in the Detroit papers which promise to be very interesting. On account of the frequent contention over schedules, particularly in Cleveland, Detroit and some other cities, the advertisement which was published in the Detroit *Free Press* of May 9, 1912, under the caption "Making Schedules for Street Cars," is very timely. The advertisement follows:

"The purpose of a street car schedule is to systematize the service, making it regular as to time and adequate as to frequency, for without schedules there would be confusion instead of order.

"It is not an uncommon belief that every line of cars has but one schedule and that this schedule is subject to but occasional revision. This is a mistake. Every line has three schedules, commonly known as week-day, Saturday and Sunday, and all three are constantly changing because of changing traffic conditions such as factories increasing in numbers or business decreasing and the resultant diminution in the number of men employed.

"Changes in schedules are made as need of changes is noted by men who keep close watch on the pulse of travel and the trend of business, and that these changes are frequent is best evidenced by the fact that two years ago it was found necessary to make twenty-seven changes on the Woodward line alone, an average of a new schedule for every two weeks.

"The making of a schedule requires much expert work not only in fixing the frequency of the cars, varying from the few used in the 'owl' service to the many used when the rush hour is on, but also in watching the variations in the length of the running time, which changes with the amount of travel. The schedule, when completed, is divided into 'runs' and assigned to the car crews.

"Not only are there those frequent changes in the standard schedules, but there are many 'one-day' schedules. For example, all lines must have such a schedule for the day before Christmas, when there is need not only for a greater frequency of day service but also for an allowance of more time to make the trip because of the longer time taken for bundle-laden people entering and leaving the cars. The State Fair, the automobile meets and the horse races all require special schedules on certain lines, and, for instance, the great river fête of Cadillaqua next July, celebrating the founding of Detroit, will require special schedules not only on the Jefferson line but upon practically every line in Detroit on account of the many thousands who will desire to witness the events.

"For the prompt and speedy handling of patrons many schedules are prepared in advance to meet the varying conditions. Take, for instance, the summer travel toward Belle Isle or Palmer Park. There will be one schedule for this in effect before the public schools close and a different one for vacation time. All this is heavy travel, and plans are made accordingly to handle it so as to have men and cars all in readiness. Not infrequently after preparations have been completed for the heavy travel a storm comes up, the people do not ride, and that schedule is made useless for the time being. A minute service may be arranged for, but the changed conditions make a three-minute service all that is required.

"In making up schedules all cars are not necessarily assigned to run between the extreme points of the line, and for a very natural reason—not for the purpose of saving mileage or reducing expenses, as some suppose.

"For instance, during the rush hours all Woodward cars do not run to Log Cabin, the end of the city service. Some of the cars turn at the Woodward carhouse and others turn at the limits 'Y' for the purpose of giving those living in between the extreme points equal transportation rights. Were it otherwise there would be no chance for such people to return to the heart of the city until all those at the extreme northern end had been taken away.

"Again, if every Fort Street car had to move to the extreme eastern end of the line to take care of the rush-hour crowds planning to go west, those who take the cars at

Cadillac Square for the west would not get the same advantages of leaving time.

"Many other things enter into the framing of schedules; as, for instance, Michigan, Gratiot and Mack forming one line, there is heavier traffic on the Gratiot-Mack portion of the run."

Twin City Rapid Transit Company's Educational Campaign

A. W. Warnock, general passenger agent of the Twin City Rapid Transit Company, Minneapolis, Minn., has started a publicity campaign to educate passengers by suggestion. The new posters are being placed in the space which has been reserved for some time in each car, either in the bulkhead at the front end or in the upper sash of the center windows on each side, for announcements by the company. The two new posters printed in colors in large type read as follows:

"SUGGESTION TO PASSENGERS

"Please do not occupy more than one seat.
"Please do not put your feet out in the aisle.
"Please treat the conductor as you would be treated.
"Please do not bring lighted cigars into the car.
"Please do not leave refuse in the car.

"FOR COMFORT OF PASSENGERS

"Only such packages as can be conveniently held on lap or put under seat will be allowed on this car. Ordinary traveling bags or suit cases, workmen's tool kits, folded (not rigid) baby carts, and bundles which are usually carried in the hand will be permitted. All such pieces must be taken into car. They must not be left on platform."

The following clause is added to every form of placard:

"Patrons are invited to telephone or write for any further information as to train or boat service of 'Twin City Lines,' to make reasonable complaints or offer helpful criticisms, and are assured that same will receive prompt, courteous, careful attention.

"A. W. Warnock, general passenger agent 'Twin City Lines,' Hennepin Avenue and 11th St., Minneapolis. N. W. telephones—Minneapolis, Main 4580 or 2071—St. Paul, Cedar 2616. T. S. telephones—Minneapolis, Center 3134 or 3133."

All complaints come to Mr. Warnock, and each one receives careful and courteous consideration. Particular attention is given to the wording of both letter and telephone replies. As a result of this publicity there is practically no adverse criticism sent to the press and the letters which are sent to the press are submitted to Mr. Warnock so that his reply may be published.

Suburban Fare Question at Los Angeles

An appeal will be taken from the decision of Judge Wood ordering the extension of the 5-cent fare limits of Los Angeles to the annexed city limits of the municipality, but Paul Shoup, vice-president of the Pacific Electric Railway, Los Angeles, Cal., has announced that the company will extend the fare limits in Colegrove and Hollywood pending the outcome of the appeal to determine the rights of the company in regard to exacting fares as the city limits are from time to time pushed out further. Mr. Shoup has said:

"The Pacific Electric Railway will establish a 5-cent fare between the business center of Los Angeles and Highland Avenue on the Hollywood line and Seward Avenue on the Colegrove line. It was promised that these fares would be effective on or before March 1 next with street car service; that promise will be carried out at the present time with standard street car service.

"Interurban cars coming from and going to sections farther out than Hollywood will continue to be available where stops are made for the residents of the Hollywood section paying 10-cent fares or presenting commutation books—in other words, using the fares in effect at this time. For example, the Van Nuys-Lankershim cars pass by the Hollywood Hotel en route to Fourth and Hill Streets, but on their way traverse a district to which the 5-cent fare is either restricted to street cars or does not apply on any cars whatsoever.

"This does not in any way modify the decision of the company to ascertain from the courts of last resort whether or not the statute of 1878 providing for a maximum street car fare of 5 cents for a journey in one general direction within a city of 100,000 population or more is applicable under present conditions, and whether or not addition of areas to cities through annexation and consolidation automatically extends the 5-cent fare under this statute.

"Manifestly any such application would be wholly unjust and would tend to immediate cessation of street car extensions, since with such a law the long lines of the company might, through the application of 5-cent fare, mean ruin to the corporations. We cannot, therefore, for one moment be expected to extend 5-cent fares on city limits basis without reference to density of traffic or distances. The whole 5-cent blanket fare for street car service, charging a passenger as much for a block as for 5 miles, is without a reasonable basis. It is the outcome of convenience—nothing else."

Single Fare Asked Between Milwaukee and East Milwaukee.—Residents of East Milwaukee have again petitioned the Railroad Commission for a single fare into Milwaukee. The case has been taken under advisement.

Accident on Indiana Road.—One person was killed and more than thirty were slightly injured on May 10, 1912, 1½ miles south of Kokomo, Ind., when southbound local car 247 was telescoped by a northbound limited car of the Fort Wayne & Northern Indiana Traction Company.

Accident in New York.—Several persons were injured in a rear-end collision on May 15, 1912, between a two-car dead train and a southbound express train at the 238th Street station of the Broadway division of the subway division of the Interborough Rapid Transit Company, New York, N. Y.

Arbitration of Differences Asked in Ottawa.—The employees of the Ottawa (Ont.) Electric Railway have sent to the Department of Labor a request for the appointment of a Board of Arbitration under the industrial disputes investigation act to consider the demand of the men for increased wages and shorter hours.

Committee Report in Favor of School Tickets in Washington.—The District committee of the House has favorably reported the bill to require the street railways which operate in Washington, D. C., to sell forty tickets for $1, good for the school children only, with the usual transfer privileges. The tickets are to be accepted between 7:30 and 9:30 a. m. and 3 p. m. and 4 p. m.

Excursions to the Beaches at Los Angeles.—Paul Shoup, vice-president of the Pacific Electric Railway, Los Angeles, Cal., has agreed to run two midweek 25-cent excursions to the beaches reached by that system during June, July, August and September. Last year the company provided for only three excursions. The days on which the excursion rate will be in force have not been fixed.

Special Dispensation for Carrying Dogs in Brooklyn.—On account of the show of the Long Island Kennel Club at Brighton Beach on Decoration Day the Coney Island & Brooklyn Railroad has agreed to allow passengers to carry dogs on the first three seats of summer cars before 10 a. m. going toward Coney Island and between 5 p. m. and 8 p. m. returning on the day of the show.

Folder of Chicago, Ottawa & Peoria Railway.—The Chicago, Ottawa & Peoria Railway, La Salle, Ill., has issued a handsome sixteen-page folder which contains a number of halftone illustrations of the "beauty spots" along the "Illini Trail," as this line is called. The folder furnishes many suggestions for picnics, camping and fishing parties, setting forth the advantages of the various parks and streams along this line and also the quality of service and rates to the points of interest.

Interstate Railroad Accidents for Quarter Ended Dec. 31, 1911.—Accident Bulletin No. 42, just issued by the Interstate Commerce Commission, shows that eighty-five persons were killed and 904 were injured in train accidents on interstate electric railways during the three months ended Dec. 31, 1911, and that five employees were killed and 158 employees were injured during the same period in accidents in which the movement of electric locomotives, motor cars or other cars was not involved.

Pensions for Employees of Maine Roads.—The Bangor Railway & Electric Company, the Lewiston, Augusta & Waterville Electric Railway and the Portland Railroad, all controlled by the syndicate headed by John R. Graham, Bangor, Me., have announced a plan to retire employees of more than twenty years' standing who have reached a stated age limit on 12½ per cent of their earnings at time of their retirement. The pension right is also to be extended to employees who are injured in the service.

Celebration in New Albany.—The Louisville & Northern Railway & Light Company, New Albany, Ind., and associated corporations, known as the public utilities of the North Side, will celebrate the tenth anniversary of the beginning of operations by them on the evening of June 1. Employees of the companies and their families and the residents of the communities served have been invited to attend the celebration, which will be held at Glenwood Park, near New Albany. A special committee of officials and employees has been appointed to arrange for the event.

Keeping Platforms Clear in Fort Wayne.—In a special order to Police Chief Dayton F. Abbott and Fire Chief Henry Hilbrecht the board of safety of Fort Wayne, Ind., has instructed the department heads to see that the officers and firemen under their charge refrain from riding on the back platforms of city cars. There is a city ordinance providing that it shall be the duty of the traction company to see that the back platforms are kept clear, and the board members called the attention of the chiefs to this, suggesting that they have their men aid the car crews in enforcing it.

Music en Route on Illinois Traction System.—The Illinois Traction System has installed a "victrola" and a dictaphone in one of its parlor cars in order to determine whether the addition of music to the diversions afforded passengers on long journeys will make these cars more popular. Passengers will be requested to dictate their opinions of the innovation to the dictaphone, and the management is looking forward with much interest to the recorded opinions of favor or disfavor of the experiment. If the test proves popular all parlor cars will have music in addition to the present comforts and conveniences.

Smoking on Milwaukee Cars to Be Abolished.—R. B. Stearns, assistant general manager of the Milwaukee Electric Railway & Light Company, Milwaukee, Wis., in charge of the railway department of the company, said recently in regard to smoking on the cars of the company: "Smoking has been prohibited for some time on the rebuilt pay-as-you-enter cars, but on the larger pay-as-you-enters and the open-platform cars we have as yet done nothing. However, we expect to have nearly all the lines equipped with the rebuilt cars in a short time, and as soon as these cars are installed a general order against smoking will be issued."

Publicity Policies for Electric Railways.—The discussion by A. W. Warnock, general passenger agent of the Twin City Lines, Minneapolis, Minn., of the paper "Publicity of Policies for Electric Railways," which was presented by James H. McGraw, president of the McGraw Publishing Company, at the midyear meeting of the American Electric Railway Association in New York in January, 1912, has been reprinted in pamphlet form by the Twin City Lines. Extracts have been added from the article "The Soul of a Corporation," contributed to the March, 1912, issue of the *World's Work* by W. G. McAdoo, president of the Hudson & Manhattan Railroad.

Operating Methods of Chicago & Oak Park Elevated Railroad Approved.—The Illinois Railroad & Warehouse Commission has rendered a decision approving the operating methods on the Chicago & Oak Park Elevated Railroad. The commission is also investigating the block signaling system and interlocking plants of the entire elevated railway system and will render a decision thereon in the near future. The elevated railways were organized under the general railroad act. The investigations of the commission were not undertaken because of any question as to faulty operating or signaling methods, but arise from its usual practice of passing from time to time on new signal installations and operating methods on the various roads in Illinois.

Decision in Westchester Fare Case.—The Appellate Division of the Supreme Court of New York handed down on May 10, 1912, a decision in the case of the Public Service Commission of the Second District of New York and the town and village of Mamaroneck against the Westchester Street Railway, unanimously affirming the order of Justice A. V. S. Cochrane at the Albany Special Term directing the company to comply with the order of the commission and carry passengers from White Plains to Mamaroneck for a single fare of 5 cents. The court gave to the company the right to continue to issue rebate checks pending an appeal to the Court of Appeals. If the highest court affirms the decision, the rebate tickets must be redeemed for the excess of fare.

Service Resumed by County Traction Company.—The County Traction Company, Chicago, Ill., which owns and operates the street railways in Forest Park and Maywood, re-opened service between these two suburban districts and Chicago on May 11, 1912. Owing to the company's insistence on a 10-cent fare from this district to Chicago the township commissioners were influenced to condemn a highway bridge across the Desplaines River over which the company operated, thus interrupting the interurban service between Maywood, Forest Park and Chicago. The bridge was condemned on Jan. 22, 1911, and since that time service has been cut off from these two suburban districts. As the service which the company formerly furnished between Chicago and Maywood was desirable, the people in the district which was affected repented of their action and the company is again operating on the old 10-cent fare basis.

Electricity Replaces Steam for Passenger Service.—On May 1, 1912, the Southern Pacific Company discontinued the operation of steam passenger trains between Los Angeles and Pasadena and passenger traffic is now handled exclusively by the Pacific Electric Railway. The Southern Pacific Company has also taken off all its steam trains between Pasadena and Shorb station and the traffic between those points is also being cared for by the Pacific Electric Railway. The Pasadena end of the steam railway has been electrified and cars and trains will be run by the Pacific Electric Railway direct from Arcade depot, Los Angeles, via Sixth and Main Streets, over the Pasadena short line direct to the Southern Pacific Company's station in Pasadena. An additional one-hour service has been added to the regular schedule of the Pacific Electric Company and special cars and trains meet every incoming train on the Southern Pacific Company and connect direct with every outgoing train. Baggage is handled in the same way as on the steam trains. The Southern Pacific Company will, however, continue to handle all its freight to Pasadena by steam.

New Rules for Passengers in Springfield.—The Springfield (Mass.) Street Railway has adopted new rules which make the age limit of children to be carried free on the lines of the company five years instead of seven, as heretofore. The regulations governing the carrying of bundles have also been revised. The new rules stipulate that bulky or dangerous packages will not be carried, and neither will bundles which exceed the size of an ordinary suit case. The rules also provide that any material liable to soil the clothes of passengers must be tightly packed. Dogs, small animals and fowls must be carried by the passenger who has them in charge. The rule which relates to the carrying of children is further restricted by the provision that if a child under age occupies a seat in a car in which passengers are forced to stand fare must be paid for the child. The enforcement of this rule, however, is left to the discretion of the conductor. The rule pertaining to bundles, etc., follows: "Passengers must not be allowed to carry bulky or dangerous packages aboard the cars and must not hang articles on the brake handles. Passengers will be permitted to carry with them only such small packages and bundles as do not exceed the size of an ordinary dress-suit case. Commodities of an oily or liquid nature placed in open receptacle will not be permitted aboard the cars. Such material must be placed in tightly closed packages and otherwise wrapped so as to avoid contact with the clothes of passengers or staining of car."

Personal Mention

Mr. W. J. Massee has resigned as president of the Macon Railway & Light Company, Macon, Ga., the Central Georgia Power Company and the Macon Gas Company.

Mr. James E. Burr has been appointed claim agent of the Eastern Pennsylvania Railways, Pottsville, Pa. Mr. Burr was formerly assistant claim agent of the company.

Mr. C. E. Calder, formerly auditor and assistant secretary and treasurer of the Eastern Pennsylvania Railways, Pottsville, Pa., has been appointed purchasing agent of the company in addition to his other duties.

Mr. J. M. Enright, who has for some time been superintendent of railways of the Toledo Railways & Light Company, Toledo, Ohio, has been appointed manager of the railway department of the company.

Mr. E. P. Newhall, formerly superintendent of the Pacific Express Company, Toledo, Ohio, has been appointed general freight and passenger agent of the Alberta Interurban Railway, with offices at Calgary, Alberta.

Mr. Samuel W. Pennypacker, formerly Governor of Pennsylvania, has been appointed a member of the Pennsylvania State Railroad Commission to succeed the late Charles N. Mann. The appointment is for the full term of five years.

Mr. Willis Lawrence, chief operating engineer of the Interborough Rapid Transit Company, New York, N. Y., will address the members of the Institute of Operating Engineers in New York on June 4, 1912. His subject will be "Handling Men."

Mr. F. H. Coble, for the last five years chief of the testing department of the United Railways & Electric Company, Baltimore, Md., has accepted a position in the engineering department of the Edison Electric Illuminating Company of Brooklyn, N. Y.

Mr. H. E. Allen has been appointed manager of the electric, gas and hot water heating departments of the Toledo Railways & Light Company, but also continues as chief clerk of the Toledo, Ottawa Beach & Northern Railway and the Maumee Valley Railways & Light Company.

Mr. William H. Felton, judge of the Superior Court for the Macon Circuit for the last sixteen years, will be president of the Macon Railway & Light Company, Macon, Ga., the Central Georgia Power Company and the Macon Gas Company, to succeed Mr. W. J. Massee, resigned. He will be formally elected to that office with these companies at a meeting to be held in the near future.

Mr. Emil G. Schmidt, who, as noted in the ELECTRIC RAILWAY JOURNAL of Sept. 2, 1911, is president of the County Traction Company of Chicago, will be elected president of the Des Moines (Ia.) City Railway and the Inter Urban Railway, Des Moines, to succeed Mr. A. W. Harris, of the Harris Trust & Savings Bank, Chicago, whose other duties have increased so that they require his entire time.

Mr. L. K. Jones, secretary of the Department of Railways and Canals of Canada, has been appointed assistant deputy minister of the department. Mr. Jones' connection with the Canadian government railway system dates back to 1871, when he was engaged on the construction of the Intercolonial Railway. Mr. Jones was appointed chief clerk in 1893 and became secretary of the department fifteen years ago.

Mr. L. E. Beilstein, whose resignation as vice-president and general manager of the Toledo Railways & Light Company, Toledo, Ohio, was noted in the ELECTRIC RAILWAY JOURNAL of April 20, 1912, continues as a director of the company and as general manager of the Toledo & Western Railroad, Toledo, Ottawa Beach & Northern Railway and the Maumee Valley Railways & Light Company, with which companies Mr. J. F. Collins, who has recently been appointed vice-president and general manager of the Michigan United Traction Company, continues as president.

Mr. F. A. Willard has been appointed general manager of the Jackson Railway & Light Company, Jackson, Miss., the property of which was recently taken over by the Kelsey Brewer Company, Grand Rapids, Mich. Mr. Willard entered business with the General Electric Company at Lynn, Mass., taking the students' course and subsequently serving in the engineering department. He served later as commercial agent of the Rochester Railway & Light Company, Rochester, N. Y., and for the last four years has been connected with the Kelsey Brewer Company as engineer and general manager of the electric plant at Kankakee, Ill., and the Red Wing Gas, Light & Power Company, Red Wing, Minn.

Mr. T. L. Miller has been appointed assistant to President F. R. Coates, of the Toledo Railways & Light Company, Toledo, Ohio, and efficiency engineer of the company. Mr. Miller is a graduate of Cornell University in the mechanical engineering department and went from the college to the Carnegie Steel Company, doing efficiency work. He was afterward connected with Marwick, Mitchell & Company, New York, cost accountants and efficiency engineers. While with Marwick, Mitchell & Company, he assisted in installing a cost system for the Buick Automobile Company, Flint, Mich., and also did work along similar lines for the Southern Iron & Steel Company and the Buffalo & Lake Erie Traction Company.

Mr. H. D. Sanderson, whose appointment as engineer of maintenance of way of the Michigan United Traction Company, with headquarters at Kalamazoo, Mich., was noted in the ELECTRIC RAILWAY JOURNAL of May 11, 1912, studied at Valparaiso University in 1898 and 1899, but during the next two years was engaged on various kinds of municipal work. He returned to Valparaiso in 1902 and was graduated with the degree of bachelor of science and civil engineer in 1904. In 1904 and 1905 he was in charge of construction on the Toledo, Ottawa Beach & Northern Railway, and in 1906 and 1907 was in charge of construction on the Sandusky, Fremont & Southern Electric Railway. In the first part of 1908 he engaged in municipal work in Fremont, Ohio, but in August, 1908, he was appointed engineer maintenance of way of the Toledo Railways & Light Company, and subsidiary lines, which position he had held until his resignation to accept a similar position with the Michigan United Traction Company.

Mr. C. F. Hewitt, for the last four years general superintendent of the East St. Louis & Suburban Railway, East St. Louis, Ill., has been elected vice-president and general manager of the Des Moines (Ia.) City Railway and vice-president and general manager of the Inter Urban Railway, Des Moines, to succeed Mr. J. R. Harrigan, resigned. Mr. Hewitt was born in Baltimore, Md., and received his early education in Pennsylvania. Early in 1890 he entered the student course of the Thomson-Houston Electric Company at Lynn, Mass., and shortly afterward was advanced to the engineering and construction department, where he was engaged in the work of installing lighting, railway and marine plants for this company and for its successor, the General Electric Company. Later he became superintendent of the Elmira Water, Light & Railroad Company, Elmira, N. Y., known at that time as the Elmira Municipal Improvement Company. He remained with this property until 1899, when he became manager of the St. Joseph & Elkhart Power Company and of the Elkhart Electric Company, with headquarters at Elkhart, Ind., where he was engaged principally in the development of hydro-electric power plants on the St. Joseph River in the vicinity of Elkhart and South Bend, Ind., and Berrien Springs, Mich. Upon the sale of these properties to other interests Mr. Hewitt accepted the position of general superintendent of the St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo., where he remained from 1903 to 1908. In the early part of 1908 he was appointed general superintendent of the East St. Louis & Suburban Railway at East St. Louis, Ill., one of the properties of the syndicate which controlled the St. Joseph Rail-

C. F. Hewitt

way, Light, Heat & Power Company, the general superintendent of which he had been since 1903. Mr. Hewitt's new appointment is effective July 1, 1912.

Mr. H. S. Cooper, who was elected permanent secretary of the Southwestern Electrical & Gas Association at the recent meeting of that association at San Antonio, Tex., was formerly general manager of the Galveston (Tex.) Electric Company. Mr. Cooper has long been identified with electrical developments and is well known in the East. He was born in the Isle of Wight, England, in 1856. His first commercial connection was with a mercantile house in Philadelphia. In 1876 he began the manufacture of agricultural machinery in the South and in this way came into touch with electrical enterprises. In 1893 he was appointed general manager of the Schenectady properties of the Electric Development Company, which consisted at that time of the electric and gas lighting and the railway services of the city, all of which were then in the hands of a receiver. In 1895 the properties were sold under foreclosure and then reorganized and placed on a paying basis by Mr. Cooper. Subsequently Mr. Cooper directed the rehabilitation of the Ithaca (N. Y.) Railway and placed that property on a paying basis. Later he became connected with the Development Company, New York, N. Y., and made critical reports on various electrical propositions for the clients of this company. In July, 1904, Mr. Cooper accepted the position of general manager of the Galveston City Railway and continued with that company and its successor, the Galveston Electric Company, until 1910.

H. S. Cooper

OBITUARY.

J. P. Mabee, chief commissioner of the Board of Railway Commissioners for Canada, died at Toronto, Ont., on May 6, 1912, following an operation for appendicitis.

Pedro Juan Rosaly, president of the Ponce Railway & Light Company, Ponce, Porto Rico, since the incorporation of the company, is dead. Mr. Rosaly of late years had devoted his time very largely to the business of Luce, Crohore & Company and to the Ponce Railway & Light Company.

John B. Golden, assistant superintendent of transportation of the Scranton (Pa.) Railway, is dead. Mr. Golden had been connected with the Scranton Railway in various capacities from September, 1896, at which time he entered the employ of the company as a clerk. In September, 1906, he was appointed assistant superintendent of transportation of the company. Mr. Golden was twenty-nine years of age and is survived by his widow and two children.

The Public Service Commission, Second District, New York, has approved of the declaration of abandonment of the portion of the Waverly, Sayre & Athens Traction Company's line on Chemung Street in Waverly. On hearings and examinations made by the commission it was shown that the total receipts of the Chemung Street line average $5.15 a day, whereas the cost of operating the car, including wages, power and car maintenance, is $14.08. The operating loss for the year ended June 30, 1911, is shown to be $3,112.90. In abandoning the Chemung Street line, passengers previously using that line have the privilege of using the Clinton Avenue belt line, which is only a short distance away. The commission expresses the view that there has been an over-building of street railway lines in Waverly, a village of less than 5000 inhabitants, according to the last census. The state highway is to be continued through Chemung Street and a share of cost of improvement would fall upon the company. This, the commission believes, would subject it to serious hardship, in view of its financial condition.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

Sacramento Valley West Side Electric Railway, Willows, Cal.—Chartered in California to build a 160-mile electric railway to connect Woodland, Willows, Orland, Corning and Red Bluff with several branch lines, one from Yolo through Davisville and Dixon to connect with the Oakland, Antioch & Eastern Railway on the Sacramento River, a distance of 36 miles. The other branch will begin at Colusa and extend through Williams and meet the main line from Red Bluff, a distance of 11 miles. Capital stock, $5,000,000. Directors: C. L. Donohue, L. P. Klemmer and H. W. Manor, Willows; E. L. Sisson, Red Bluff, and J. Reith, Jr., Willows. [E. R. J., April 20, '12.]

Louisville & Taylorsville Traction Company, Taylorsville, Ky.—Incorporated in Kentucky to build an electric railway between Louisville and Taylorsville. Officers: John Speed, president; L. F. Jewell, vice-president; R. D. Barker, treasurer, and R. L. Thurman, secretary. [E. R. J., Feb. 24, '12.]

Roundup (Mont.) Interurban Railway.—Incorporated in Montana to build an electric railway between Roundup, Farrell, Lavina and Davis. Capital stock, $100,000. Incorporators: M. H. Wall, August Schrump, H. E. Marshall and Martin Rausch. [E. R. J., March 23, '12.]

***Stark-Summit Railroad, Alliance, Ohio.**—Incorporated in Ohio to build an electric railway from Alliance to Akron. Capital stock, $1,000. Incorporators: E. S. Cook, F. S. McGowan, E. A. Foote, A. R. Manning and L. M. Percival.

***Lawton Railway & Light Company, Lawton, Okla.**—Chartered in Oklahoma to build an electric railway in Lawton. Capital stock, $10,000. Incorporators: B. R. Stephens, W. H. Fuller, R. L. Scheig, B. W. Hilgard and B. E. Tabler, all of McAlester.

Texas Electric Company, Dallas, Tex.—Application for a charter has been made by this company in Texas to build a 200-mile electric railway between Dallas and Austin. Capital stock, $1,000. Incorporators: I. V. Watkins, J. J. Metcalf, A. Ragland, E. H. Conibear, R. V. G. Vaughin, all of Dallas, and J. M. Henley, of Jacksonville. [E. R. J., May 4, '12.]

FRANCHISES

Glendale, Cal.—E. D. Goode has received a franchise from the Council to build an electric railway from Glendale to Griffith Park, 2 miles. [E. R. J., April 13, '12.]

Martinez, Cal.—The East Shore & Suburban Railway, Richmond, has received permission from the Supervisors of Contra Costa County to double-track San Pablo Avenue and Potrero Avenue from the Alameda County line to Richmond.

Pullman, Cal.—Henry C. Cutting, Richmond, has asked the Supervisors for a franchise through Pullman and along that portion of Cutting Boulevard lying outside the city limits of Richmond. [E. R. J., March 23, '12.]

Sacramento, Cal.—The Sacramento & Woodland Railway has asked for a franchise on Second Street, Sacramento.

***Santa Monica, Cal.**—The Aerial Trolley Car Company has asked the Council for a forty-year franchise over Fremont Street, in Santa Monica.

Tulare, Cal.—The Big Four Electric Railway, Tulare, will ask the Council for a franchise in Tulare. The company will also ask for a franchise in Visalia. [E. R. J., May 4, '12.]

Fairfield, Conn.—The Connecticut Company has received a franchise from the Selectmen of Fairfield for a line to extend from the Brooklyn Country Club as far north as the Stratfield center.

Washington, D. C.—The Washington Railway & Electric Company has received authority from the Senate to extend its lines in Washington along Fourteenth and Fifteenth Streets Northeast to connect the East Capitol Street line with the Benning road line, and the Thirteenth and D Streets Northeast line with both the others.

Batesville, Ind.—The Indianapolis & Cincinnati Traction Company, Indianapolis, has asked the Council for a franchise over three different routes through Batesville.

Dubuque, Ia.—The Union Electric Company, Dubuque, has asked the Council for a twenty-five-year franchise to build a certain line in Dubuque to connect with its present lines and to extend its tracks into Eagle Point Park.

Baton Rouge, La.—The Baton Rouge Suburban Electric Company has asked the Council for a franchise from Baton Rouge to South Baton Rouge, also to a point in the northern part of Baton Rouge. S. J. Gianelloni, Baton Rouge, president. [E. R. J., April 6, '12.]

Orange, Mass.—The Athol & Orange Street Railway, Athol, has asked the Council for a franchise to extend its line on East Main Street and along Water Street in Orange to a building to be used for a freight station.

Bogota, N. J.—The Public Service Railway, Newark, has asked the Borough Council for a fifty-year franchise in Bogota. The company has received a franchise from the Trustees of Ridgefield Park to extend its tracks from the Bergen turnpike north through Ridgefield Park.

Long Branch, N. J.—The New Jersey Central Traction Company has received a fifty-year franchise from the Council for a line in Long Branch. This extension will connect Red Bank and Long Branch via Little Silver and Elkwood Park.

Brookhaven, N. Y.—The Public Service Commission, Second District, has authorized the building of the Suffolk Traction Company's line across the tracks of the Long Island Railroad east of Holtsville Station, in Brookhaven, Suffolk County, by means of an overhead structure.

Yorkville, N. Y.—The Utica & Mohawk Valley Railway, Utica, has asked for a franchise in Yorkville.

Springfield, Ohio.—C. L. S. Tingley, of the American Railway, Philadelphia, Pa., has applied to the City Council of Springfield for a blanket franchise covering the entire system of the Springfield Railway. Paul C. Martin, attorney for the company, and City Solicitor Howard McGregor have been asked to prepare a franchise by May 28. Mr. Tingley states that the company desires to issue new bonds to the extent of $300,000 in order to secure funds for improvements, but that this cannot be done without the renewal of the franchise for a period of twenty-five years.

St. Catharines, Ont.—The Niagara, St. Catharines & Toronto Railway has asked the Council for a franchise along Niagara Street in St. Catharines in order to extend its line to Niagara-on-the-Lake.

Greensburg, Pa.—The West Penn Railways, Pittsburgh, has asked the Council for a perpetual franchise to operate its line through additional streets in Greensburg.

Memphis, Tenn.—The Memphis Street Railway has received a franchise from the Commissioners for an extension of its Jackson Avenue line through the property of the Speedway Land Company to McLean Boulevard in Memphis.

Logan, Utah.—The Logan Rapid Transit Company, Logan City, has received a franchise from the Commissioners to build from Providence to Smithfield, 9 miles.

Logan, Utah.—The Ogden, Logan & Preston Railway, Salt Lake City, has received a franchise from the County Commissioners to build its proposed line through Logan County. M. J. Gollightly, Salt Lake City, is interested. [E. R. J., Sept. 23, '11.]

Salt Lake City, Utah.—William H. King has received a franchise from the City Commission to build an electric railway along First West Street, in Salt Lake City. It is the intention to extend this line into the coal regions of Emery County. [E. R. J., April 13, '12.]

Lynchburg, Va.—The Lynchburg Traction & Light Company has received a nine-year extension of its franchise in Lynchburg. The company is to double-track the business section of Main Street, and it has contributed $30,000 to the cost of repaving the street.

Seattle, Wash.—The Highland Park & Lake Burien Railway, Seattle, has received a franchise from the Council to build its line within the city limits of Seattle. W. H. Murphy, Seattle, president. [E. R. J., Feb. 24, '12.]

TRACK AND ROADWAY

Calgary (Alta.) Municipal Railway.—This company is now building 18 miles of new track.

Fresno, Coalinga & Tidewater Company, Fresno, Cal.—This company, which plans to build a railway between Fresno, Coalinga, Hollister, Salinas and Monterey, has elected the following officers: Roy Hall, president; J. W. Briscoe, vice-president; G. P. Cummings, treasurer, and Albert Albrecht, general manager and secretary. [E. R. J., Feb. 3, '12.]

San Francisco, Napa & Calistoga Railway, Napa, Cal.—This company has awarded the contract for grading 8 miles of new track between St. Helena and Calistoga to C. H. Cushing, Richmond. It has also let contract for building of bridges, one of which is to be 210 ft. in length, over the Napa River near Calistoga. The company is now building the extension.

Marysville-Colusa Railway, San Francisco, Cal.—This company has awarded to Maney Brothers & Company the contract for the construction of the Marysville-Coluca branch of the Northern Electric Railway. [E. R. J., Dec. 23, '11.]

Big Four Electric Railway, Tulare, Cal.—This company has ordered ties from the J. J. McIntyre Company, San Francisco, for its railway to connect Tulare, Visalia, Porterville and Lindsay. Work will be begun at once on the first section between Tulare and Visalia. David Oliver, Jr., is interested. [E. R. J., May 4, '12.]

Connecticut Company, Hartford, Conn.—Plans are being made by this company to extend its line from the terminal of the Windsor and Rainbow line at Rainbow to the East Granby depot.

***Tampa, Fla.**—It is reported that the Fidelity Realty Company expects to build an electric railway on the island at Anna Maria Beach. S. R. Maxwell, Tampa, is interested.

***Cambridge, Indian Valley & Eastern Railroad, Cambridge, Idaho.**—Surveys have been begun by this company for its electric railway from Cambridge to a point about 16 miles through the Indian Valley. D. Highley, New Meadows, Idaho, is engineer in charge of the surveys.

***Peoria, Ill.**—Arthur G. Black, William M. Allen and associates are making preliminary arrangements to build an electric railway between Peoria and Galesburg via Kickapoo and Brimfield. The right-of-way has been obtained in Galesburg.

Chicago, Peoria & Quincy Traction Company, Quincy, Ill.—This company will begin preliminary and location surveys between Peoria and Quincy at once. In addition to the route described in the ELECTRIC RAILWAY JOURNAL of April 20, 1912, branch lines have been planned to Havanna, Beardstown and Canton. The company proposes to obtain its entrance into Peoria over one of the lines of the local companies and will build its own tracks into Quincy with direct connections with the Wabash and the Chicago, Burlington & Quincy railroads. It is planned to furnish limited and local train service between Quincy and Peoria and freight service will be added as the business warrants. Officers: W. E. Elliott, general manager; C. A. Van Ness, secretary; B. G. Vasen, treasurer; F. W. Monroe, general counsel; R. H. Baldwin, chief engineer. [E. R. J., April 20, '12.]

Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind.—It is reported that this company will lay new rails and new ties on its interurban line from Fort Wayne to Logansport. Expenditures aggregating $2,000,000 are being considered by the company.

Cedar Rapids & Iowa City Railway, Cedar Rapids, Ia.—During the next few weeks this company will award contracts to build about 15 miles of new track.

Waterloo, Cedar Falls & Northern Railway, Waterloo, Ia.—Grading has been begun on this company's line from Waterloo to La Porte City. J. B. Eley Company, Marshalltown, Ia., has the grading contract and the Gould Construction Company, Davenport, Ia., has the bridge work.

Aroostook Valley Railroad, Presque Isle, Maine.—Surveys have been begun at both ends of the proposed extension from Washburn to Caribou.

Hagerstown & Clear Spring Railway, Hagerstown, Md.—This company has awarded the contract for the grading,

bridging, rails and carhouse for its 25-mile electric railway between Hagerstown and Clear Spring to Robert H. Moffit, Jr., Harrisburg, Pa.

*Boston, Mass.—Sealed bids for building Section A of the Dorchester Tunnel, which section is in Winter Street and is about 500 ft. long, will be received by the Boston Transit Commission, B. Leighton Beal, secretary, until noon on May 23, 1912. Plans can be seen and specifications and forms of contract can be obtained at 15 Beacon Street, eighth floor.

Anaconda Copper Mining Company, Electric Light & Railway Department, Anaconda, Mont.—During the next four weeks this company will award contracts to build about ½ mile of new track and replace about 2,000 ties in Anaconda.

Flathead Power & Traction Company, Polson, Mont.—Plans are being made by this company to extend its line from Kalispel to Calgary, via Gateway at the International boundary, thence up the Elk River Valley to the Kananaskis River and thence down the valley of the Kananaskis River to Calgary. [E. R. J., March 23, '12.]

Nashua (N. H.) Street Railway.—Plans are being considered by this company to extend its tracks up Amherst Street from the present terminal to Wellman Avenue in Nashua.

Buffalo & Lake Erie Traction Company, Buffalo, N. Y.—This company has been asked to consider plans to extend its line through Glenwood Park, via State Street and upper Peach Street, Buffalo.

Corning & Painted Post Street Railway, Corning, N. Y.—The construction of an extension to North Corning is being considered by this company.

Third Avenue Railway, New York, N. Y.—A hearing will be held by the Public Service Commission of the First District on May 20 on the application of the Third Avenue Bridge Company, a subsidiary of the Third Avenue Railway, for the approval of a contract between the Bridge company and the Central Park, North & East River Railroad for the use of the southerly track of the latter company in Fifty-ninth Street. The Bridge company operates cars over the Queensboro Bridge and is to be operated as a part of the Third Avenue system in Manhattan. The use of the Central Park Company's track in Fifty-ninth Street is needed to connect the Manhattan lines of the Third Avenue Company with the Bridge company's lines.

Union Railway, New York, N. Y.—This company has received permission and approval from the Public Service Commission for the exercise of a franchise for and the extention of its lines over Boscobel Avenue, in the Bronx, to Aqueduct Avenue and across the Washington Bridge over the Harlem River to 181st Street and Broadway, in Manhattan.

Syracuse & South Bay Electric Railway, Syracuse, N. Y.—During the next few weeks this company will award contracts to build 6 miles of new track.

Sauquoit Valley Electric Railway, Utica, N. Y.—Right-of-way has been secured by this company for its line between New Hartford and Clayville, via Washington Mills, Chadwicks and Sauquoit. Albert P. Seaton, New Hartford, is interested. [E. R. J., March 30, '12.]

Utica & Mohawk Valley Railway, Utica, N. Y.—Plans are being considered by this company to extend its tracks in the vicinity of Roscoe Conkling Park.

*Cincinnati, Ohio.—A. L. Claiborne, Richmond, Va.; J. B. Walker, Cincinnati, Ohio, and A. C. Walker, Luray, Va., it is reported, plan to construct a traction line from Cincinnati to Paris, Ky. A preliminary survey is now being made. The proposed route of the new line would be Cincinnati, Butler, Falmouth, Claysville, Mount Olivet, Cynthiana, Paris.

*Cleveland, Ohio.—Councilman Moylan of Cleveland has prepared a plan for the construction of an electric railway along Walworth Run between Clark Avenue S. W. and West Sixty-fifth Street and a point near Scranton Road S. W. and Fairfield Avenue S. W., which he believes will give rapid transit service to a large section on the West Side. The city owns property along Walworth Run and it is Mr. Moylan's idea that such a line would add much to the value of this land for factory purposes also. Street Railway Commissioner Peter Witt will be asked to consider the plan and take it up with the Cleveland Railway.

Columbus, Kenton & Toledo Traction Company, Kenton, Ohio.—This company has amended its charter to read from Columbus to Findlay, 90 miles, through the counties of Franklin, Union, Marion, Hardin and Hancock, and has its application before the State Public Service Commission to allow the issue of capital stock and bonds sufficient to build 50 miles of line between Findlay and Richwood. The directors are A. G. Ahlefeld, Burr Finnell, Abe Rosenthall, J. W. Caine and J. E. Gasson, all residents of Kenton, Ohio. The officers of the road are A. G. Ahlefeld, president; J. W. Caine, vice-president; B. Finnell, secretary; Abe Rosenthall, treasurer; G. T. Wiswell, chief engineer and general manager. [E. R. J., April 27, '12.]

Oklahoma (Okla.) Railway.—This company announces that work will be begun at once on an extension from Monroe south to Norman and that the line from Edmund to Guthrie will be finished by July 1, 1913. The company has filed a mortgage for $300,000 with the Mississippi Valley Trust Company, St. Louis. The money will be used for the extensions.

Portland, Eugene & Eastern Railway, Portland, Ore.—This company has resumed the construction of its line in Eugene. It has purchased a tract of land, 80 ft. x 160 ft., at Eleventh Street for freight yards.

Southern Cambria Railway, Johnstown, Pa.—Construction has been begun by this company on the extension of its line to Ebensburg.

Philadelphia & West Chester Traction Company, Philadelphia, Pa.—All municipal ordinances and all right-of-way have been secured for the extension of this company's railway from Drexel Hill to Media, a distance of 6 miles. It will be graded for two tracks, but only one will be laid for the present.

Pittsburgh, Steubenville & Wheeling Street Railway, Pittsburgh, Pa.—Surveys have been made by this company for a main line from Wheeling to Pittsburgh, via Steubenville, Burgettstown, Midway, McDonald and other points. It is now proposed to build another branch south from Primrose into Washington, Pa., via Hickory, Westland and Gretna, 15 miles. W. H. Hildebrand, Pittsburgh, is interested. [E. R. J., Dec. 10, '11.]

Williamsport (Pa.) Passenger Railway.—This company plans to extend its line to Duboistown in the near future.

Amarillo (Tex.) Traction Company.—This company plans to make some important extensions in Amarillo.

Texas Traction Company, Dallas, Tex.—The Hull Street extension of this company's lines in Denison was completed and placed in operation on May 1.

Longview & Junction Street Railway, Longview, Tex.—During the next three weeks this company will award contracts to build about ¾ mile of new track in Longview.

Southern Wisconsin Railway, Madison, Wis.—During the next few weeks this company will award contracts to build 1 mile of new track in Madison.

Manitowoc & Northern Traction Company, Manitowoc, Wis.—Surveys have been begun by this company on its 1-mile extension in Manitowoc.

SHOPS AND BUILDINGS

Calgary (Alta.) Municipal Railway.—In June the Calgary Municipal Railway will award contracts to build an addition to its carhouse in Calgary. The structure will be 50 ft. x 190 ft.

San Francisco, Napa & Calistoga Railway, Napa, Cal.—During the next few weeks this company will award contracts to build new terminal buildings at Calistoga.

Hagerstown & Clear Spring Railway, Hagerstown, Md.—This company has awarded the contract for the construction of its carhouse to Robert H. Moffit, Harrisburg, Pa.

Minneapolis, St. Paul, Rochester & Dubuque Electric Traction Company, Minneapolis, Minn.—An arrangement has been entered into for a long term of years whereby this company will use the depots and terminals of the Great Western Railroad at both Northfield and Faribault and the latter company's tracks between those towns.

Rochester, Syracuse & Eastern Railroad, Syracuse, N. Y.—During the next few weeks this company will award contracts to build a new carhouse and repair shops at Newark.

Portland Railway, Light & Power Company, Portland, Ore.—During the next two weeks this company will award contracts to build a new carhouse at East Ankeny Street and Twenty-eighth Street in Portland. The structure will be 185 ft. x 74 ft. and of brick construction.

Wilkes-Barre (Pa.) Railway.—Plans are being made by this company to house all its cars at Westmoor. The present carhouse on the flats will be torn down, it is said, and a modern new brick and cement structure erected on the site.

Southern Wisconsin Railway, Madison, Wis.—During the next few weeks this company will award contracts to build an addition to its carhouse in Madison.

POWER HOUSES AND SUBSTATIONS

Geary Street Municipal Railway, San Francisco, Cal.—This company has awarded a contract for its substation equipment to the Westinghouse Electric & Manufacturing Company.

Waycross Street & Suburban Railway, Waycross, Ga.—This company has ordered one 230-kva two-unit, three-bearing motor-generating set, one 5-kw exciter and switchboard from the General Electric Company.

Waterloo, Cedar Falls & Northern Railway, Waterloo, Ia.—This company's power house at Waterloo was destroyed by fire on May 8. The loss is estimated to be about $125,000.

Louisville (Ky.) Railway.—The first contract for the work on the new power house of this company has been let to the Henry Bickel Company, Louisville, which will handle the excavation work and lay the foundations, as well as a pipe system connecting the plant with the Ohio River. Machinery for pumping will be installed by the railway company. The buildings have been designed by D. X. Murphy & Brother, Louisville, and contracts for the superstructures will be let in the near future. The Louisville & Interurban Railway has ordered two turbo-generating outfits, a rotary converter and two extensive switchboard equipments from the Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa.

Bangor Railway & Electric Company, Bangor, Maine.—Work has begun on the proposed dam for a new power station at Veazie, 4 miles above Bangor. The new dam is for the Bangor Railway & Electric Company, but will be owned by the Bangor Power Company, a subsidiary company.

Meridian Light & Railway Company, Meridian, Miss.—This company has placed an order for one 100-kw, 600-volt compound-wound rotary converter, two 35-kva transformers, one 50-hp motor and switchboard with the General Electric Company.

St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo.—This company will install in its power house a new 3,000-kva, 2,300-volt three-phase Curtis turbo-generator unit which has been purchased from the General Electric Company.

Binghamton (N. Y.) Railway.—This company has ordered new station equipment, consisting of one 1,167-kva three-phase Curtis turbo-generator unit, one 25-kw turbo-exciter, one 35-hp motor-driven exciter set, one 500-kw rotary converter, one 230-kva synchronous motor, one 200-kva generator and switchboard, from the General Electric Company.

Public Service Traction & Light Corporation, Cleveland, Ohio.—This company has ordered one 500-kw rotary converter from the General Electric Company.

Republic Railway & Light Company, Youngstown, Ohio.—This company is said to be negotiating with the Stone & Webster Company, Boston, in reference to plans for the construction of a new power house in Youngstown.

Tacoma Railway & Power Company, Tacoma, Wash.—This company has placed an order for one 200-hp, 2,300-volt motor and controlling apparatus with the General Electric Company.

Manufactures and Supplies

ROLLING STOCK

Michigan United Traction Company, Jackson, Mich., is said to be figuring on twenty interurban cars.

Southern Wisconsin Railway, Madison, Wis., expects to purchase ten single-truck pay-as-you-enter cars.

Wilkes-Barre (Pa.) Railway has ordered one 43-ft. construction car body from The J. G. Brill Company.

Citizens' Traction Company, Oil City, Pa., has ordered eight single-truck cars from the St. Louis Car Company.

United Railways & Electric Company, Baltimore, Md., is reported to be considering the purchase of forty double-truck cars.

Lewisburg, Milton & Watsontown Passenger Railway, Milton, Pa., has ordered one double-truck storage battery car from The J. G. Brill Company.

New York, New Haven & Hartford Railroad, New Haven, Conn., has ordered twenty-four new single-phase electric locomotives from the Westinghouse Electric & Manufacturing Company.

British Columbia Electric Railway, Vancouver, B. C., has ordered, through the Interborough Rapid Transit Company, New York, N. Y., a sample stepless car from The J. G. Brill Company.

Philadelphia (Pa.) Rapid Transit Company has ordered 300 additional 34-ft. 1⅜-in. near-side semi-convertible car bodies and 600 Brill No. 39-E trucks without wheels from The J. G. Brill Company.

New York (N. Y.) Railways Company will receive bids at once for 150 stepless cars. The cars will be of the same type as the sample car which was described in the ELECTRIC RAILWAY JOURNAL of March 16 and April 20, 1912.

Calgary (Alta) Municipal Railway has ordered six 41-ft. 6-in. pay-as-you-enter cars, one sprinkler and one sightseeing car from the Preston Car & Coach Company. Deliveries have just been made to the railway of six 41-ft. cars by the Preston Car & Coach Company and six 46-ft. cars by the Ottawa Car Company.

Dominion Power & Transmission Company, Hamilton, Ont., noted in the ELECTRIC RAILWAY JOURNAL of April 20, 1912, as planning to purchase twenty-four cars this year, has arranged to have twelve single-track cars built by the Preston Car & Coach Company, but the cars have not yet been requisitioned. It is understood that the order for the twelve double-truck cars will not be placed until next year.

TRADE NOTES

Allegheny Steel Company, Allegheny, Pa., has appointed Theodore G. Seixas its general manager of sales.

Grasselli Chemical Company, New York, N. Y., has moved its New York offices to 80 Maiden Lane.

Standard Steel Car Company, Butler, Pa., has let a contract for the erection of a new steel car spring plant, to be 180 ft. x 90 ft., and to employ, when completed and in full operation, 700 men.

Wilmington Fibre Specialty Company, Wilmington, Del., has recently purchased the entire plant of the J. C. Parker & Sons Fibre Company, New Castle, Del. The Wilmington Fibre Specialty Company intends to operate this plant in conjunction with its own factory in Wilmington.

Earl Gear & Machine Company, Philadelphia, Pa., has received a contract to design and manufacture the operating machinery for a double-leaf transfer bridge at St. George, Staten Island, which is to be built by the Fort Pitt Bridge Company for the Staten Island Rapid Transit Company.

U. S. Metal & Manufacturing Company, New York, N. Y., has appointed Howard K. Porter its Southern railroad department manager with headquarters in the Candler Building, Atlanta, Ga. Mr. Porter was recently connected with the Lorain Steel Company as one of its Southern representatives.

Crocker-Wheeler Company, Ampere, N. J., has transferred J. E. Fries to the San Francisco office as Pacific Coast engineer. This addition was made to the present

organization owing to the rapidly increasing business of the company on the Pacific Coast. On April 1 the company opened an office in the Title Insurance Building, Los Angeles, Cal.

Barber Company, York, Pa., has delivered a single-truck gasoline-electric car to the Hummelstown & Campbellstown Street Railway for use on its line between those cities. The car is 34 ft. long and 8 ft. 4 in. wide and seats forty passengers. The entrances are at the center of the car. It is equipped with a six-cylinder, 54-hp gasoline engine connected to a 30-kw generator, which supplies current for two 25-hp motors. Power for lighting is supplied by storage batteries under the seats. Three cars of the type described will soon be placed in operation on this line.

Tool Steel Gear & Pinion Company, Cincinnati, Ohio, has adopted a new method of marking its gears and pinions to assist railway companies in making tests and keeping up mileage records. In the manufacture when machining the periphery of gears or pinions a small groove is made in the center of the face. When the teeth are cut this leaves a little groove running around the gear visible on the top of each tooth. After the gear has been in service and the teeth polished this pocket fills with lubricant and is so plainly visible that it will attract attention any time a change is made in armature or axle. If the shopmen have instructions to watch for special gearing, this marking will attract their attention even though they make no effort to see the regular stenciled lettering. Railway companies frequently find it difficult to follow pinions or gears because of the unrecorded changes in armatures, and it is believed that this method will be to a large extent instrumental in overcoming this difficulty.

General Electric Company, Schenectady, N. Y., has received the following orders for car equipment: San Diego (Cal.) Electric Railway, one GE-73-C, 75-hp, four-motor car equipment, one combined straight and automatic air-brake equipment with CP-28 compressor; Toledo Railway & Light Company, Toledo, Ohio, eight straight-air-brake equipments with CP-27 compressors; Southwest Missouri Railroad, Webb City, Mo., eight GE-203-A 50-hp railway motors; Carolina Power & Light Company, Raleigh, N. C., seven GE-80 40-hp railway motors and six K-11 controllers; Wichita Falls (Tex.) Traction Company, two GE-54 25-hp two-motor car equipments and two straight-air-brake equipments with CP-28 compressors; Waycross Street & Suburban Railway, Waycross, Ga., four GE-54-A 25-hp two-motor car equipments; Worcester (Mass.) Consolidated Street Railway, five GE-80-A 40-hp four-motor car equipments and five straight-air-brake equipments with CP-27 compressors; Chicago & Interurban Traction Company, Chicago, Ill., seven GE-210 70-hp four-motor car equipments with K-34 controllers, twelve straight-air-brake equipments with CP-27 compressors, twenty K-34-D controllers and accessory car equipment apparatus.

Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., has received orders for car equipment as follows: Indiana Union Traction Company, Anderson, Ind., fourteen quadruple equipments of No. 303 D motors and H L control; Wellsburg, Bethany & Washington Railway, Wellsburg, W. Va., one double equipment of No. 307 motors and K-10-M control; Washington & Old Dominion Railway, Washington, D. C., twelve quadruple equipments of No. 306 motors and HL control; Burlington County Traction Company, Hainesport, N. J., one quadruple equipment of No. 101 B2 motors and K-28-B controllers; Toledo Railway & Light Company, Toledo, Ohio, twenty double equipments of No. 310 C motors and K-36-G control; Cumberland (Md.) Electric Railways Company, three double equipments of 92-A motors and K-10-A controllers; Jamestown (N. Y.) Street Railway, four quadruple equipments of No. 307 motors; Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind., one quadruple equipment of No. 303 A motors; Mexican (Mex.) Tramways Company, one quadruple equipment of No. 321 A motors and HL control; Shreveport (La.) Traction Company, two double equipments of No. 306 motors and K-36-G control; East St. Louis, Columbia & Waterloo Railway, St. Louis, Mo., one quadruple equipment of No. 317 motors with HL control.

ADVERTISING LITERATURE

Tungstolier Company, Conneaut, Ohio, has published Bulletin No. 120, which describes the new Tungstolier weather-proof industrial lighting unit recently placed on the market.

A. B. Sanders & Company, Philadelphia, Pa., have issued Booklet No. 107, which contains a list of second-hand cars and power machinery which the company has on hand for immediate delivery.

National Electric Lamp Association, Cleveland, Ohio, has issued a bulletin entitled "Train Lighting Lamps," covering the description, performance and economy of Mazda and Gem lamps in train-lighting service.

Crocker-Wheeler Company, Ampere, N. J., is mailing a circular, which contains a reprint of the front cover of the *Electrical World*, in which attention is called to the largest core-type butt-joint transformers ever built.

Brown Hoisting Machinery Company, Cleveland, Ohio, has issued a 40-page catalog which describes and illustrates the Brownhoist pillar crane, hand-wrecking crane, mast jib crane, bracket jib crane, pillar jib crane, stationary bridge crane and transfer table.

Hess-Bright Manufacturing Company, Philadelphia, Pa., has issued a 32-page catalog entitled "Ball Bearings in Woodworking Machinery." The uses and application of Hess-Bright ball bearings are described and numerous illustrations are presented showing machines which are equipped with this type of ball bearing.

Wilmarth & Morman Company, Grand Rapids, Mich., has issued Catalog No. 98, in which its complete line of grinding machinery is described and illustrated. The products of the company include drill grinders, cutter, reamer, drill and tool grinder, water tool grinder, lathe center grinder, surface grinders, loose pulleys and wood bit grinders.

Ingersoll-Rand Company, New York, N. Y., has issued Bulletin No. 2010, in which its Crown pneumatic hammers are described and illustrated. Form No. 8003 is descriptive of the company's Imperial type E pneumatic hammers. Form No. 8004 describes and illustrates Crown rotary pneumatic drills and Form No. 8005 covers Imperial piston drills. Imperial motor hoists and stationary motors are described in Form No. 8006, and Crown bench and floor sand rammers are shown in Form No. 8108.

NEW PUBLICATION

The Signal Dictionary. 600 pages, 899 illustrations. Simmons-Boardman Publishing Company, New York and Chicago. Leather, $6. Cloth, $3.50.

This is the second edition of this well-known book and contains, besides definitions, standards and illustrations, a series of articles describing concisely the different systems and typical illustrations. Thirty-eight pages are devoted entirely to descriptions of electric railway block signals, and this section should be of great value on account of the increasing interest taken by electric railway companies in block signaling. The systems described and illustrated are as follows: Nachod signal system, the United States Electric block signal system, Kinsman block system and Eureka signal system. Illustrated descriptions of the following installations on electrically operated roads are presented: New York Central electric zone, Lehigh Valley Transit Company, Hudson & Manhattan Railroad, New York electric zone of Pennsylvania Railroad, Washington Water Power Company Railway, San Francisco, Oakland & San José Consolidated Railway (the Key Route), Interborough Rapid Transit Company's subway and elevated divisions, electrified lines of the Long Island Railroad, West Jersey & Seashore Railroad, Boston Elevated Railroad, Sykes Electric Tunnel Signal, and Waterloo & City Electric Railway, London, England. Selective signaling for electric railways also is described. The descriptions cover the following types: United States Electric selective signaling system, General Railway Signal Company selective system, the Blake signal, the Western Electric selective signal, Stromberg-Carlson dispatcher's signal. The very complete section of the dictionary devoted to interlocking should be of particular interest to those electric roads which come in contact with steam railroad engineers in connection with the installation of interlocking plants.